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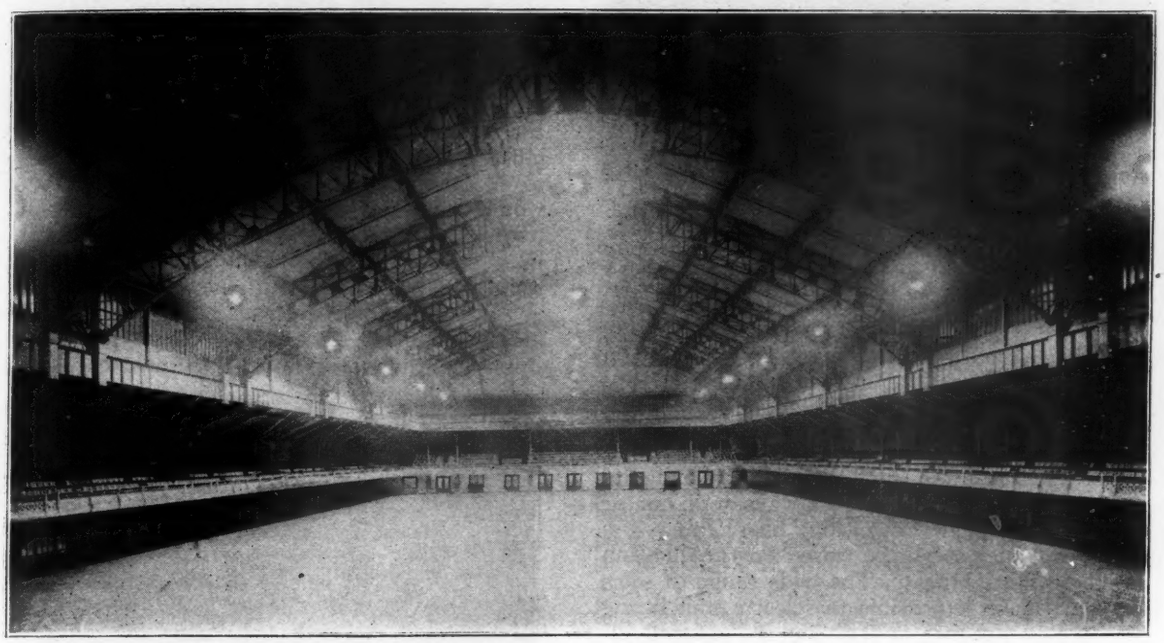


Interior of the 22nd Regiment Armory, New York City.

This building, which is 170 ft. by 390 ft. by 70 ft. to the peak of the roof, with brick side walls, light green ceiling and pine flooring, is lighted with twenty-one 1000-watt, bowl-frosted, type C lamps in deep-bowl, porcelain enameled steel reflectors suspended by steel cables. The actual watts per sq. ft. is 0.3, and the generated lumens per ft. is 0.6.

The Illumination of Armories and Gymnasiums

Character and Use of Such Buildings Are Determining Factors in Selecting and Installing Lighting Equipment — Results of Investigations of Typical Installations, with Recommendations

By A. L. POWELL and A. B. ODAY

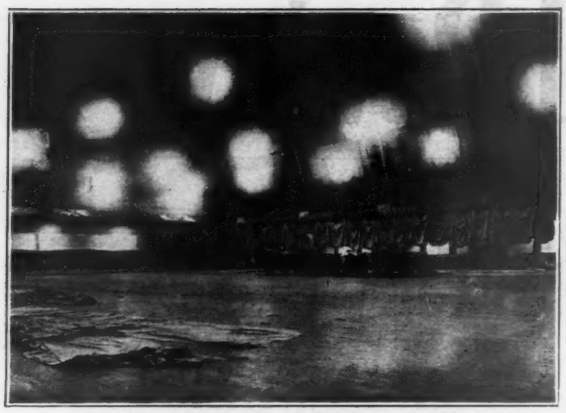
Edison Lamp Works, Harrison, N. J.

When one thinks of an armory, the drill shed alone is usually pictured; yet some of these structures are very elaborate indeed, having also a gymnasium, theater, rifle ranges, bowling alleys, billiard room and the like.

The drill shed is, of course, the most important part of the armory and should receive the most attention. As a general proposition the usual form is a large open space with an arched roof. The size varies from 600 ft. by 300 ft. by 120 ft. high to 76 ft. by 92 ft. by 38 ft. high. The roof is often partly glass to admit daylight, and usually the iron work is exposed.

Many drill sheds have balconies for the seating of spectators, necessitating special lighting below to prevent dense shadows which would result if only the general lighting was provided. The character of the floor depends on the branch of service, armories for the cavalry having a dark brown tanbark, and for the infantry having a light hardwood floor. Naturally the floor has a marked effect on the quantity of light which must be supplied, about twice the wattage being needed to illuminate to a given intensity the cavalry drill shed with its floor of low reflecting power in comparison with a shed with ordinary wooden floor.

On account of the simplicity of operation and maintenance, the high efficiency of light production, the pleasing color of light, and the adaptability to reflectors for giving any desired distribution of light, the type C lamp has become

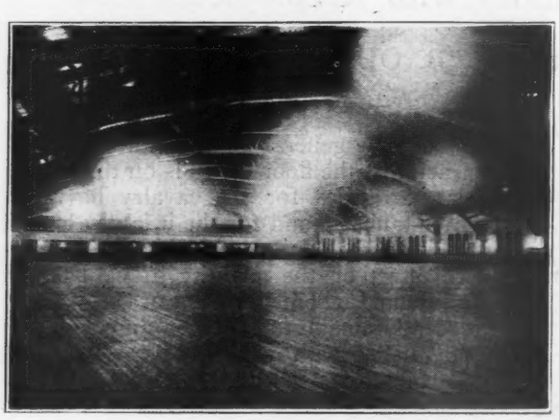


Interior of 69th Regiment Armory, New York City.

This building, which is 190 ft. by 200 ft. by 100 ft. to the peak of the roof, with brick side walls with white wainscoting, gray roof and wooden flooring, is lighted with forty-eight 400-watt, bowl-frosted, type C lamps in deep-bowl, prismatic reflectors, there being two lamps per fixture. The actual watts per sq. ft. is 0.5, and the generated lumens per sq. ft. is 7.2.

practically the standard illuminant, supplanting other forms of equipment for lighting drill sheds. The large areas permit the use of high-candle-power units and the lofty ceilings give hanging heights such that lamps are always well out of the ordinary angle of vision, overcoming any objection which might be raised on the question of intrinsic brightness. The wide range of sizes available make it possible to select a unit fitting any chosen spacing and giving the desired intensity of illumination. Inexpensive fixtures, holders, sockets and reflecting devices are standardized, thus avoiding the added cost of special designs which are sometimes attendant on propositions of these magnitudes. The character of the light makes it especially well suited, as it has no very marked tendency to distort color values, which are of importance on dress occasions.

The uses to which the drill hall is put are somewhat varied. The drilling of raw recruits takes place on only a portion of the floor and does not require the entire area to be lighted; battalion and regimental drills and reviews necessitate full illumination for ease of maneuvers and inspection; gun drills in the coast defense and artillery sometimes need all lights out; or the armory is often rented to charitable organizations and the like for fairs and bazaars, which demand brilliant lighting as well as special decorative or spectacular effects. In any event, sufficient light must be provided in all parts of the room to meet the most exacting conditions.



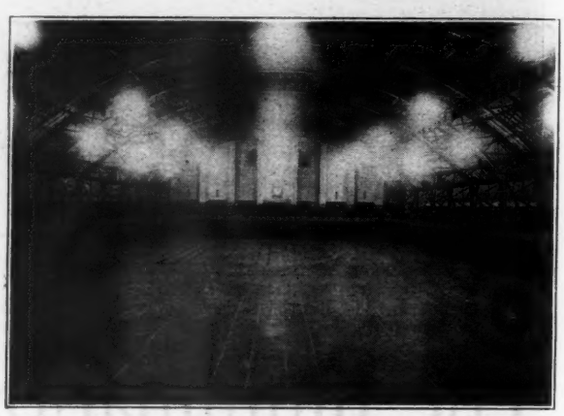
Interior of State Armory, Albany, N. Y.

This building, which is 175 ft. by 240 ft. by 45 ft. to the peak of the roof, with cream side walls, pine ceiling and dark wood floor, is lighted with twenty-six 750-watt, clear type C lamps in opalescent inclosing globes with two external porcelain enameled steel reflectors per fixture. The actual watts per sq. ft. is 0.45, and the generated lumens per sq. ft. is 7.1.

Choice of Reflector Equipment.

Appearance is one of the factors which must be given consideration, as the general effect of the room must be attractive, particularly if used for other than regimental purposes. Efficiency must also be considered, as there are large areas to be illuminated, and an extravagant fixture would make the cost of proper lighting prohibitive. Eye protection must be assured, as glare in such work as gun training would materially reduce the effectiveness of the unit.

Since the ceilings are usually broken by trusses and often quite dark, as a general proposition direct lighting is essential. In most cases it is advisable to use either a translucent reflector or a unit which permits some of the light to escape above the horizontal, for if the ceiling is totally dark an unpleasant effect will result. Occasionally, however, the floor is light enough to reflect sufficient light back to the ceiling even if opaque bowl reflectors are employed.



Interior of 7th Regiment Armory, New York City.

This building, which is 185 ft. by 275 ft. by 40 ft. to the peak of the roof, with green side walls, green ceiling and light wood floor, is lighted with twenty-eight 1000-watt, clear, type C lamps in two-piece, prismatic, inclosing units with steel cable suspensions. The actual watts per sq. ft. is 0.55, and the generated lumens per sq. ft. is 10.6. The average illumination is 3.3 foot-candles.

The type of distribution will vary with conditions. If the side walls are quite dark a unit giving a wide curve is inadvisable as far too much flux will be wasted by wall absorption. With light walls, however, diffuse reflection will assist in the general illumination, and concentration of the light is not as necessary.

An investigation of 30 armories as to equipment and spacing of units, condition of surroundings, etc., showed that ten of them were provided with deep-bowl, dense-opal, direct lighting reflectors. This type of unit is low in first cost and efficient in directing light downward. It transmits a certain percentage of the light which serves to illuminate the ceiling. Six of the armories were equipped with inclosing globes of opalescent glass with an external porce-

lain enameled steel reflector. This equipment is comparatively inexpensive, gives good diffusion and pleasing light. As a considerable portion of the light is in a horizontal direction the utilization constant is rather low. Five armories employed deep-bowl, mirrored-glass reflectors, which are very efficient in redirecting the light, although introducing comparatively little diffusion. They are rather high in first cost. Four buildings utilized deep-bowl, prismatic-glass, direct lighting reflectors. These are efficient, of moderate price and have the property of transmitting a small proportion of the light upward. Porcelain enameled steel reflectors of the deep-bowl and dome types were installed in three of the armories. Such accessories are low in first cost, efficient, durable and simple to maintain. If the floor is light in color, sufficient light will be reflected to the ceiling to offset the fact that no light is transmitted by the units. One armory employed inclosing globe units with no external reflectors. The amount of light received on the floor is a small percentage of the total flux. Such

Interior of Cavalry Drill Shed in Brooklyn, N. Y.

This building, which is 175 ft. by 310 ft. by 70 ft. to the peak of the roof, with cream side walls, cream ceiling and white sand, shavings and loam as floor, is lighted with thirty-one 750-watt, clear, type C lamps in deep-bowl, dense-opal, direct lighting reflectors with steel cable suspensions. The actual watts per sq. ft. is 0.4, and the generated lumens per sq. ft. is 7.8. The average illumination is 3.25 foot-candles.

fixtures give excellent diffusion and are pleasing in appearance, although rather inefficient for this purpose.

Cleaning and Renewal of Lamps and Reflectors.

On account of the high hangings employed, some sort of a lowering device should be provided. Most of the single-unit fixtures weigh so little that a simple steel cable will safely support them; a cutout hanger with lowering rope or wire simplifies this phase of maintenance. In some cases the cutout is omitted, the cable passing through a pulley, and then down the sides of the room, the current-carrying wires hanging in loops.

The automatic cutout hanger is a desirable feature where lamps are hung very high and where it would cost considerable to build scaffolding for renewing and cleaning lamps. In some armories a walk is provided in the roof trusses above the units from which the lamps can be maintained.

Although often not considered, convenience of

View from Firing Point of Short Rifle Range.

The targets are illuminated locally by means of 50-watt, type B lamps in angle steel reflectors.

control of the lighting system is an important point. For instance, in the coast defense armories when practicing with the guns it is often desirable to hurriedly turn off a group of lamps.

In some armories remote control is employed. The man in charge of the entire floor has a board with pilot lights and switches. At each gun are a number of push buttons, and when the batteries are firing the officer in charge can at once signal for any group of lamps to be extinguished. The whole armory can be thrown in darkness in an extremely short time. With systems of lighting formerly employed it required a number of men for this work, with the attendant delay.

Intensity of Illumination Desirable in Armories.

From general considerations the cavalry and field artillery armories would require less light than those of the other branches of service, as they are not likely to be used for social purposes. This is counteracted, however, by the fact that the tanbark or loam floor absorbs a great deal of light and makes the place appear abnormally dark.

As indicative of modern practice the actual power consumption for the armories with wooden floors varied from 0.25 to 0.55 watt per sq. ft., the average figure being 0.37 watts. Lamps of varying efficiencies were employed in the different buildings, making it necessary to compare

View from 50-Yard Point of a Rifle Range.

The targets are illuminated by 25-watt, type C lamps in mirrored trough reflectors.

Views Showing Contrast Between a Rifle Range with Local Lighting and with Flood Lighting.

Quite different firing conditions are produced. In the former case a brightly lighted area is surrounded by comparative darkness, and in the latter case considerably less contrast is introduced.

results in terms of generated lumens per sq. ft. These varied from 4.4 to 10.6, with an average of 6.5. In most instances fairly efficient reflecting equipment was installed and the installations probably had a coefficient of utilization somewhere between 40 and 50%. The illumination, therefore, varied from 2 to 5 foot-candles, with the average in the neighborhood of 3 foot-candles. Actual tests in two armories showed approximately 2.5 foot-candles of illumination quite uniform in character.

In the armories with tanbark floors, the actual watts per sq. ft. varied from 0.23 to 0.55, with an average of 0.34. The average generated lumens per sq. ft. were 6.2. A test in one of these showed the illumination to vary between 2 and 4 foot-candles, with an average of 3.25.

Color of Surroundings, Sizes of Lamps and Types of Fixtures.

The roof is usually of a dark tone, deep greens, grays and natural dark wood finishes seeming to prevail. Lighter colors, while desirable from a standpoint of light reflecting power, tend to show dirt accumulations more readily and are, in general, not desirable from an illumination standpoint.

Lighter tones, varying from white to natural brick, are found as side wall coverings. The extremely large areas, if finished in a very light tone, would be somewhat annoying from glare, but it is desirable that the upper part of the side walls be finished in light colors even though the lower portion is somewhat darker. This feature would make the lighting considerably more efficient and introduce a certain amount of diffusion.

The areas to be illuminated are large and the possible hanging heights great. Therefore, large lamps should be used. Another reason is that the larger incandescent lamps are more efficient than the smaller ones. Present practice in armories varies from 300- to 1000-watt units, the 750- and 1000-watt sizes predominating.

Lighting of Rifle Ranges.

Practically no fixture is necessary for this class of service and the majority of buildings employ a simple steel cable as a support. In some of the older installations which have been remodeled, lamps are installed on multi-arm fixtures. A symmetric arrangement of outlets, the number of rows depending on the width of the building, is and should be followed.

So many factors enter into the proper illumination of rifle ranges, such as glare, contrast, tensity, uniformity, surface brightness, type of sight employed, and so on, that it is inadvisable to attempt to outline the proper practice. Some authorities feel that an indoor rifle range should approximate outdoor conditions and have employed floodlighting for this purpose, the main beam of the projector being trained on the target, illuminating this to a high intensity and the stray light illuminating the side walls of the tunnel. This arrangement prevents the unnatural condition of a very bright object being surrounded by a totally dark area.

At some of the short-range galleries, the targets are controlled from the shooting position by means of a continuous wire and hand wheel. Above each target position is located a 60-watt clear type B lamp in an angle steel reflector approximately 12 ins. in front of and 18 ins. above the target. This gives an average illumination on the target of 12 foot-candles.

One of the rifle ranges investigated was 360 ft. in length and consisted of a tunnel 14 ft. high and 14 ft. wide, the walls being of brick and the ceiling of concrete. General illumination was provided in the firing room by small lamps in diffusing glassware. Across the tunnel at the 50- and 75-yard points were placed mirrored trough reflectors with 25-watt lamps. A similar unit was placed in front of the targets. Heavy crystal glass plates set in the floor in front of each target permitted the diffused light to pass through it, illuminated the telephones and provided sufficient light for the scorers in the butts to prepare fresh targets. The auxiliary lighting along the tunnel prevented the extreme contrast which would be present if the targets alone were illuminated.

Conditions Affecting the Lighting of Company Rooms.

These are, in fact, club rooms with uses similar to those of residential living rooms. Decorative yet comfortable lighting should be provided, the intensity must be fairly high and illumination even, owing to the diversified requirements. There seems to be a tendency to decorate such rooms with dark finishes which, of course, detract from the apparent brightness

of them. The furnishings of some of these rooms are very elaborate, yet in many such cases but little attention has been paid to the lighting system and its decorative qualities have been neglected.

The fixtures used are often quite commercial, whereas an excellent field is offered for special designs in etched and colored glassware and appropriate metal work. One can conceive how the artist could work into the glass decoration the company letter, U. S. A. monogram or the eagle in a similar manner to emblem bowls designed for lodge rooms. Diffused semi-indirect lighting with appropriate fixtures seems to be one logical method of treating this part of the building.

Utility of equipment is essential in the locker rooms. Bowl-enameled type C lamps located between rows of lockers and fitted with standard dome reflectors are particularly applicable. Somewhat higher illumination should be provided in the neighborhood of the mirrors in order to facilitate dressing.

Lighting of Shops and Stables

The accoutrements and spare supplies are placed on racks or shelves and must be fairly well illuminated for inspection and ease of locating a given article. Efficient equipment such as just described should be so placed that an even intensity will be produced over the shelves. The work bench, which is often located in this room, should have one or two well-shaded localized lamps to facilitate the repair and cleaning of arms and other apparatus.

A low intensity of light is sufficient in the less-frequented parts of the building to prevent accidents, but in the main corridors enough illumination to readily recognize a passerby, with sufficient excess to avoid any danger of accident in the event of a crowded condition.

The band room, quartermasters' and armorers' departments offer no special problems beyond that of the average interior.

The stables for the cavalry horses are often located in the basement of the armories. Comparatively little light is required and the lamps should be of low candlepower, so that they can be placed at fairly frequent intervals without excessive energy being consumed. The ceilings are usually low and if too wide spacing is used some of the stalls will be in deep shadow. A fairly satisfactory arrangement is found in one armory where there is an aisle approximately 15 ft. wide between rows and stalls. Two rows of 25-watt clear lamps are used in each aisle, these being installed without reflectors, close to the whitewashed ceiling, and one lamp in front of every second stall. This gives plenty of light for harnessing, cleaning and feeding the horses, and the passageway is well illuminated.

The Illumination of Gymnasiums.

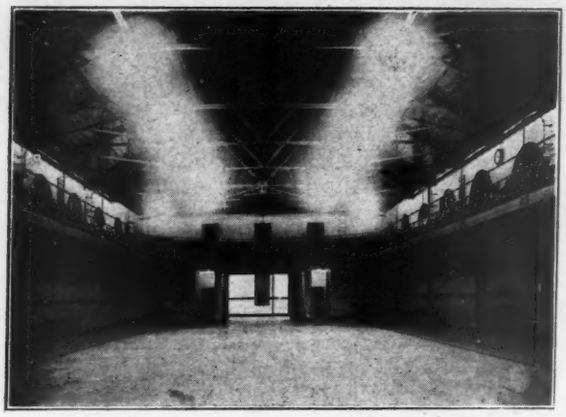
The main room of a gymnasium is usually rectangular in shape with a moderate height of ceiling and with a running track as a balcony 6 to 8 ft. wide around all four sides of the room. In the center of the main floor are the principal pieces of apparatus, such as horses, bucks, jumping standards, and parallel bars, while the flying rings and horizontal bars hang from the main ceiling. The latter usually can be drawn up out of the way for basketball, indoor baseball and wrestling matches or practice. Below the balcony are found the exercisers of the various types, and racks for wands, dumb-bells and Indian clubs.

The center part of the space requires even illumination of a moderate intensity, with lamps so located that the hanging apparatus will not cause dense shadows. Particular attention should be paid to the shielding of the eye from the lamp filament, for one is forced to look upwards a great deal when playing basketball and often faces the ceiling in ring and bar work. A blinding effect is particuarly serious at such times and may cause bad accidents.

The illumination on the apparatus attached to

View of the Gymnasium at Princeton University.

This room is 100 ft. by 165 ft. by 40 ft., with cream walls and brown ceiling. An average illumination of 3 foot-candles is produced with an energy consumption of 0.5 watts per sq. ft., the ratio of maximum to minimum illumination being but 1.3. Illumination tests on the walls beneath the running track indicated an illumination of approximately 1 foot-candle.



Gymnasium at Union College, Schenectady, N. Y.

This building, which is 60 by 120 ft., is lighted with 40-watt, clear, type C lamps in semi-inclosing units consisting of a diffusing glass dish suspended beneath a large porcelain enameled steel reflector. There is provided 1 watt per sq. ft. of floor space.

the side wall below the track need not be as high in intensity as in the open space, yet in many cases it is necessary to provide a few outlets with small lamps properly shaded to prevent dense shadows.

Results of Investigation of Typical Gymnasiums.

The general discussion applying to the choice of units for armories also applies to gymnasiums. An investigation of 52 typical college, high-school and Y. M. C. A. gymnasiums showed that nearly 50% employed old-style equipment consisting of lamp cluster bodies with flat white glass or enameled steel reflectors. These were, in general, placed close to the ceiling and surrounded by wire cages or guards. This type of fixture is unsightly, gives a poor distribution of light and is inefficient, since light from one lamp must pass through the adjacent partially blackened bulbs. These flat clusters have the particular objection that they expose the entire filament.

Of the 22 gymnasiums with modern equipment, seven were equipped with dome enameled steel reflectors, one with deep-bowl enameled steel reflectors, four with deep-bowl mirrored-glass reflectors, two with deep-bowl prismatic-glass reflectors, two with flat-type opalescent-glass reflectors, three with opalescent inclosing globes, two with opalescent inclosing globes with enameled steel reflectors, and one with opalescent glass semi-indirect dishes.

In these 22 buildings the minimum watts per sq. ft. was 0.42, the maximum was 2.0 and the average was 0.78. The average generated lumens per sq. ft. was 9.0. As most of the equipment employed was of an efficient character and side walls were generally light in color, varying from white to natural brick, and the ceiling, in contrast to the dark ceiling of the armory, usually also light, a fair average figure for the intensity of the illumination provided was between 4 and 5 foot-candles. The size of lamp varied from the 60-watt vacuum type to the 750-watt gas-filled type.

In some instances, the ceiling of the building is of such a character that efficient lamps in deep-bowl mirrored-glass reflectors can be recessed so that the mouths of the reflectors are flush with the ceiling. This arrangement directs light strongly downward, lamps are not visible unless one looks directly upward, and there is no danger of breakage.

Sometimes when opaque reflectors are used for direct lighting, a number of small lamps are also provided in inverted reflectors which direct light to the ceiling and prevent it from being totally dark. Where direct lighting with opaque reflectors is employed for the main portion of the floor, it is sometimes advisable to utilize bowl-shaped opalescent glass units beneath the running track or balcony. These provide good illumination on the side-wall apparatus and at the same time emit some light in a horizontal direction, overcoming the "dead" effect which results if only strong directional light is employed.

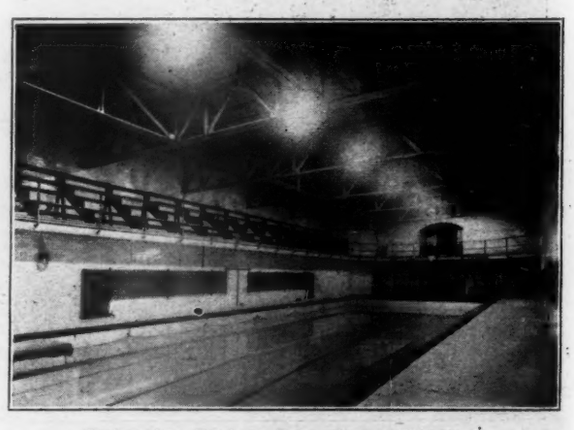
Lighting of Swimming Pools and Locker Rooms.

The swimming pool, from a lighting standpoint, is practically a modified Ulbrich sphere. for the side walls and ceiling are generally white tile. The type of reflecting device employed makes but little difference in the illumination. Care should, of course, be taken to insure satisfactory eye protection.

An examination of eight pools using either prismatic-glass bowl, opalescent-glass bowl, mirrored-glass bowl or enameled steel reflectors showed the watts per sq. ft. employed to vary from 0.3 to 0.7, with an average of 0.5.

In the shower room there is no special problem in regard to lighting, but on account of the high percentage of vapor present in the air it is advisable that moisture-proof electric fittings be employed.

In the locker rooms, double rows of lockers with aisles between in most cases extend to the ceiling. The athletes dress in these aisles. Mirrors are ordinarily placed at the ends of rows on the main aisle. Low ceilings of light color make practical the use of low-candlepower, all-frosted lamps without reflectors, and with sockets set flush. In a number of the installations examined 25-watt lamps were used on 8-ft. centers. Larger lamps with suitable reflectors localized near the mirrors on the main aisle are essential.



Swimming Pool at Princeton University.

This pool is 35 ft. by 130 ft. and is lighted with seven 200-watt, bowl-frosted, type C lamps in dome, enameled steel reflectors located in a single row in the center of the room. The illumination on the surface of the water is approximately 2 foot-candles.

A 60-watt lamp with bowl-shaped dense-opal reflector between pairs of mirrors proves satisfactory.

Running Track and Miscellaneous Exercising Rooms.

Although in most cases the running track extends about the main exercising room and the general illumination is sufficient for the track, sometimes a long track is installed in the form of a low tunnel. For such conditions angle-type reflectors pointing in the direction the runner is proceeding avoids any likelihood of glare and directs the light where it is required.

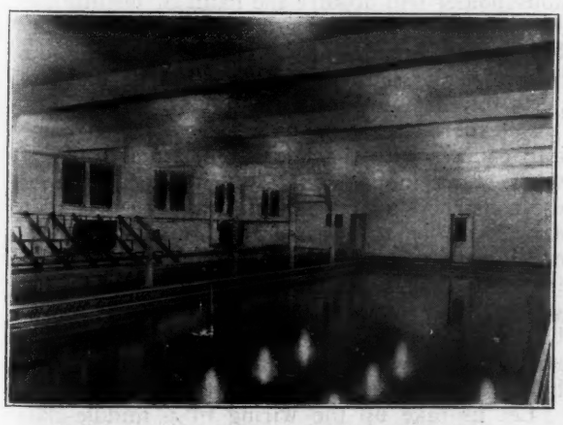
The miscellaneous rooms are the wrestling, boxing and fencing rooms, the medical director's office. Fencing requires a high intensity of illumination, and since one room only is provided for all these sports, in such cases the lighting layout must be considered from the standpoint of fencing. Since the action is rapid, it is essential that the light be well diffused and of high intensity in order that all movements may be readily followed.

The finish of these rooms is usually light in color, with smooth ceilings, making indirect and semi-indirect systems of illumination quite feasible. Approximately 1 watt per sq. ft. of floor area with type C lamps proves satisfactory with semi-indirect lighting. As the rooms are often decorated with prizes, pennants, etc., the decorative element of the fixture is important.

In the medical director's office the ordinary requirements for office lighting are experienced, as well as the necessity for plenty of light in all parts of the room for physical examinations. Totally indirect or dense-glass semi-indirect units are suitable.

URGES TEACHING OF METRICS IN PUBLIC SCHOOLS.

In one of the papers read at the recent annual meeting of the American Metric Association the writer of the paper made a plea for the teaching of metrics in public schools, at least until the system was thoroughly mastered by the pupils, by itself alone and not merely as an auxiliary study to that of our common system of weights and measures. Only after there is a full understanding of the metric system, historically and practically, the writer contended, should the pupil be shown how this system could be converted into the terms of the commonly used system, or vice versa.



Swimming Pool at Union College, Schenectady.

Lighted with 100-watt, bowl-frosted, type C lamps in bowl-shaped dense opalescent glass, direct lighting reflectors, 0.7 watts per sq. ft. being provided.

Locker Room at the Princeton University.

Lighted with 60-watt, clear, type B lamps in flat, prismatic glass reflectors. The room is finished in dull gray paint, and the lamps are spaced 8 ft. by 14 ft., located close to the 11-ft. ceiling.

In a recent issue of the *Decimal Educator* (London, Eng.), J. W. Lander treats of the teaching of decimal fractions. Toward the close of his article he says: "I plead for the teaching of decimals as decimals, apart from vulgar fractions, until the student has mastered their nature and application, just as I advocate the teaching of the metric system apart from the British equivalents."

This is approaching the teaching of the metric system along rational lines, and it is to be hoped that the school authorities, both here and in England, will see the force of the argument and give pupils and students a chance to master the system and to think in its terms before they are required to think of it in comparison with the terms and equivalents of other systems.

MUNICIPAL ELECTRICAL ENGINEERS' CONFERENCE IN ENGLAND.

The annual convention of the Municipal Electrical Association, the event of the summer for electrical engineers and others connected with municipal electrical undertakings in England, will be held at Ilkley and Bradford, June 22-25. After the presidential address by T. Roles, electrical engineer for the city of Bradford, papers will be presented on the following subjects: "Design of Distribution Networks," by C. A. Gillin; "Power-Station Design in Relation to Thermal Efficiency," by I. V. Robinson, and "Standardization of Tariffs," by J. W. Beauchamp.

MEETING OF CONFERENCE CLUB IS POSTPONED.

The meeting of the Conference Club scheduled to be held at White Sulphur Springs, W. Va., June 17-19, has been postponed until a date to be selected later in the year. Announcement will be made of the new date of meeting as soon as it is chosen by the arrangements committee. Sullivan W. Jones, 19 West 44th street, New York City, is the secretary of the club.

Wiring of a Middle-Class Home

Suggestions for Installation of Adequate Outlets Which Will Enable the Contractor to Make Recommendations to Householders So Possibilities of Electricity in the Home May Be Realized

By M. LUCKIESH
Nela Research Laboratory, Cleveland, Ohio.

Having discussed the possibilities of lighting in the middle-class home in previous articles, it appears of interest to summarize the subject by means of typical wiring layouts which are justifiable on the basis of the importance and effectiveness of artificial light in the home. One of the most discouraging factors in the development of residence lighting is the paucity of outlets. A number of interests are responsible for this condition. Those central-station companies which continue to penalize the householder for the installation of outlets are inhibiting progress in lighting. The contractor who does not encourage the installation of more outlets is not only failing to promote the cause of lighting but in many cases is responsible for placing a blight upon the home.

The average householder has about one baseboard outlet in his home, this being especially true of apartments. Considering the inadequacy of other outlets, it is not surprising that the householder has not learned of the possibilities of lighting. But this scarcity is not confined to apartments as is easily determined. On investigating houses during their construction it is common to find only one or two baseboard outlets in houses which cost from $10,000 to $25,000.

Value of Adequate Outlets Should Be Appreciated.

Sometimes the attitude of a contractor-dealer is not only one of indifference but actually reactionary in character. For example, let us take a case which occurred some time ago. A man building a house for his own home had come to realize that artificial light was really an important factor in making a house a home and he had laid out the wiring in accordance with his ideas of convenience and adequateness. In fact, the wiring diagrams were those shown in this article. In going over the plans with a contractor-dealer the latter suggested the elimination of an outlet or switch here and there until a total of ten had been recommended for elimination. When the contractor had finished his consideration of the plans the householder asked why a contractor should assume an attitude which appeared to operate to his disadvantage. He replied to the effect that he always had the interests of his client in mind, but it will be left to the reader to analyze the motive which prompted the elimination of ten outlets.

The householder, who knew that the cost of outlets was insignificantly small compared with their importance, insisted that the elimination of these outlets (at a saving at that time of $15) was not to his advantage. In fact, he correctly stated that such a procedure would really result in a blight upon the home which would exist as long as the house existed. Furthermore, in a few months the house would be completed and the contractor-dealer would then attempt to sell the householder various electrical devices, such as a heater, a toaster, a flatiron, portable lamps, a vacuum cleaner, etc., each of which would demand a convenient baseboard or wall outlet for connecting it.

Adequate Outlets to Be Urged by Entire Industry.

All the efforts of other interests toward progress in residence lighting will be reduced in effectiveness as long as electrical contractors do not appreciate the value of adequate wiring and recommend it. This does not mean that other interests are on the side of progress as opposed to the contractor. In fact, none of those who come into contact with the householder is placing sufficient emphasis upon the importance of lighting effects and the insignificant cost of lighting.

The central-station company should campaign against the idea that lighting is costly and should emphasize that it should not be viewed with the same attitude as the householder maintains toward fuel and food. The architect and builder must be reached, for they are often in the best position to recommend adequate wiring and to show the advantages of lighting. In fact, they can easily show that a few baseboard outlets will bring greater returns in the sale of a house than any investment of equally insignificant magnitude.

The fixture dealer is generally consulted about fixtures after the wiring is completed, but if a demonstration room is installed, as suggested in the second article of this series, in due time the householder will acquire the habit of visiting the lighting artist for advice concerning the wiring It has been found that this would be true if the fixture dealer let it be known that he had experts for that purpose.

But there are so many interests which come into contact with the householder, and some of these at an inopportune time in the course of the construction of the home, that the best plan appears to be to educate the householder concerning the possibilities and importance of lighting. Attempts have been made to do this, but in general they have not taken up the matter of lighting effects in the broader manner which does not fail to awaken the interest of the householder and to secure his enthusiastic support.

Let us take up the wiring of a middle-class home which was built three years ago. Sufficient time has elapsed to establish a justification of the various outlets and controls. An inspection

of the accompanying diagrams will reveal an adequacy of outlets and switches seldom and perhaps never equalled in a middle-class home. but it may be stated that the existence of each outlet and switch has been justified. This is proved by the fact that none of these would be dispensed with for much more than their present cost of installation during construction.

Details of Wiring of Typical Middle-Class Home.

Beginning with the first-floor plan, Fig. 1, let us analyze the living room. No ceiling fixtures have been installed, but a two-circuit outlet was provided for possible future demands. Switches control these two circuits respectively at the main entrance and at the stairway. However, not intending to install a ceiling fixture, the baseboard outlet at the front end of the room is attached to a switch at the front entrance. In order to have artificial light on entering from the stairway at the opposite end, the pair of brackets which flank the mantle is connected to a switch at the stairway entrance.

The arrangements of the furniture, such as piano, library table and davenport, were carefully studied before deciding upon the locations of the outlets, the switches, etc. A table lamp is provided for at the front end. In the corner on the left is an outlet to which is attached electrical equipment (including a small lamp) of a modern phonograph. On the mantle is an outlet for decorative candlesticks and at the left is another outlet for a "beauty spot" of light. The remaining baseboard outlets are utilized for a floor lamp near the piano, for a floor lamp at one end of the settee (on the left center of the room ordinarily) and a miniature floor lamp at the other end. The latter may be moved close to a chair and thus serve as a portable reading lamp. Every outlet is in use in this room.

In the dining room a two-circuit outlet is found in the center of the ceiling. This supplies a fixture which emits a well-controlled downward component of light illuminating the table predominantly and an upward component for a moderate general illumination. An outlet in the floor under the table may be used for electrical

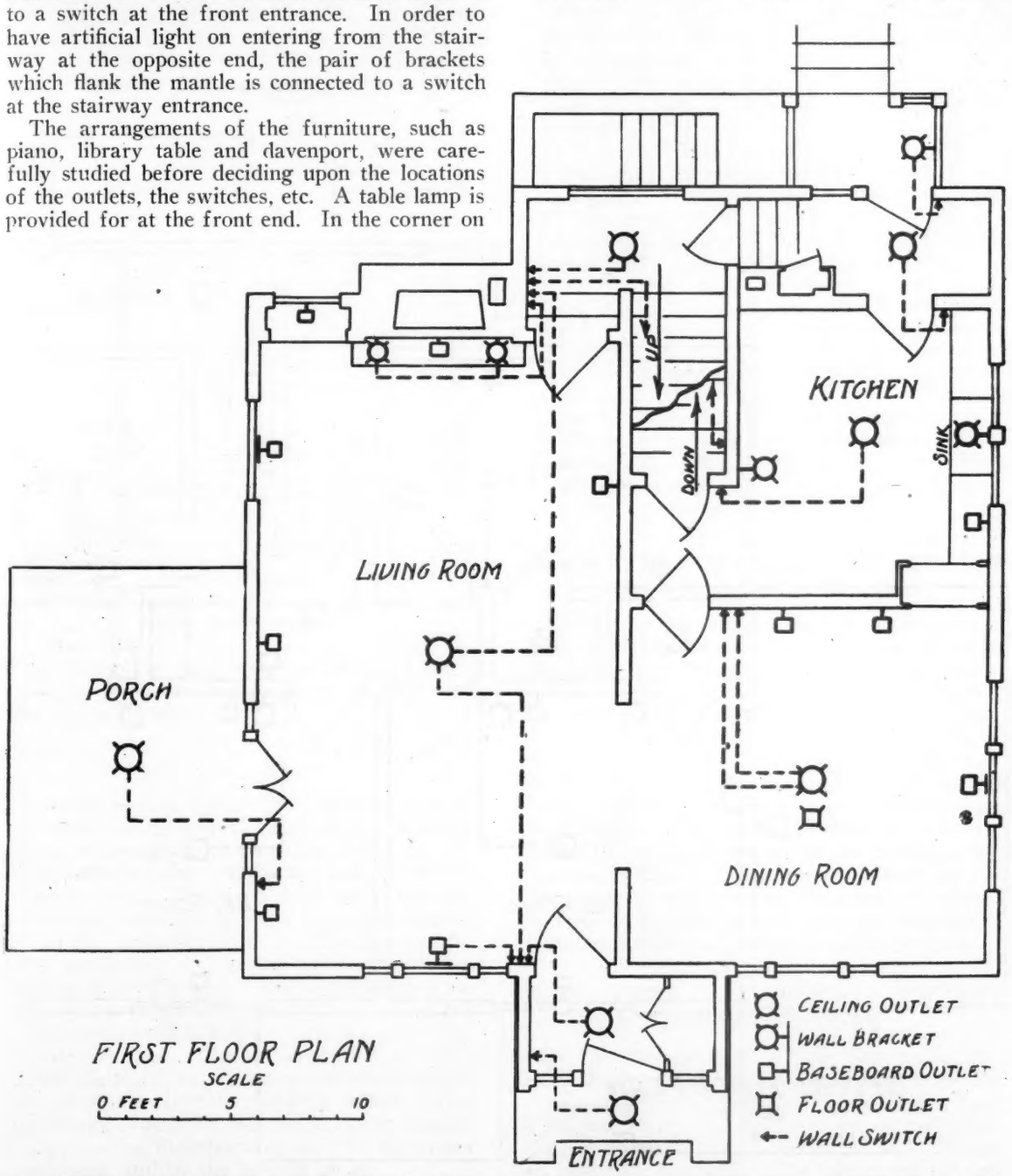


Fig. 1—Wiring Diagram Which Indicates Adequate Circuits, Outlets and Controls for First Floor of a Middle-Class Home.

devices on the table. One of the baseboard outlets supplies a pair of candlesticks on the buffet, and the others are used for electrical apparatus, although one serves also to supply a decorative lamp.

In the kitchen an electrical outlet in the center of the ceiling is controlled by a wall switch conveniently located. The combination fixture is a wall bracket at the left near the stove. Another bracket with pendent shade is placed over the sink. In the rear hall and on the rear porch are ceiling prismatic balls controlled by switches as shown. At the front entrance is a pendent lantern and in the vestibule is a ceiling husk, both being controlled by switches. On the porch at the left is a ceiling fixture consisting of a prismatic ball and controlled by a switch at the side entrance.

Ceiling outlets are installed in the stairways, each being controlled by a three-way switch. The wiring diagram of the second floor is shown in Fig. 2. Here again the best arrangements of furniture were determined before the outlets were located. For example, in the front bedrooms the windows were located in this manner, and in each of these rooms twin beds may be used if desired without any interference of the windows. Each room is wired for a ceiling outlet controlled by a switch at the entrance. A baseboard outlet is available between the beds at the windows in the front bedrooms. This serves for connecting a portable lamp and on certain occasions affords a connection for electrical devices. Two wall brackets are provided, one on each side of the dresser, and a baseboard outlet is installed for connecting dresser lamps. In case only one bed is used the other baseboard outlet may be used for the dressing table. The den, which in some cases would be a small bedroom, is supplied with two brackets and two baseboard outlets. All closets are supplied with pendent lamps and pull-chain switches.

The bathroom mirror is flanked by small brackets and a wall receptacle near the floor is provided for the connection of electrical devices. In the upper hall is a baseboard outlet to which a portable lamp may be attached for the purpose of supplying a decorative touch to this otherwise unfurnished space. However, the possibility of using this outlet for this purpose was not sufficiently evident to justify its installation, but the fact that it affords a place for connecting a vacuum cleaner which can serve all rooms on this floor without disconnecting resulted in the

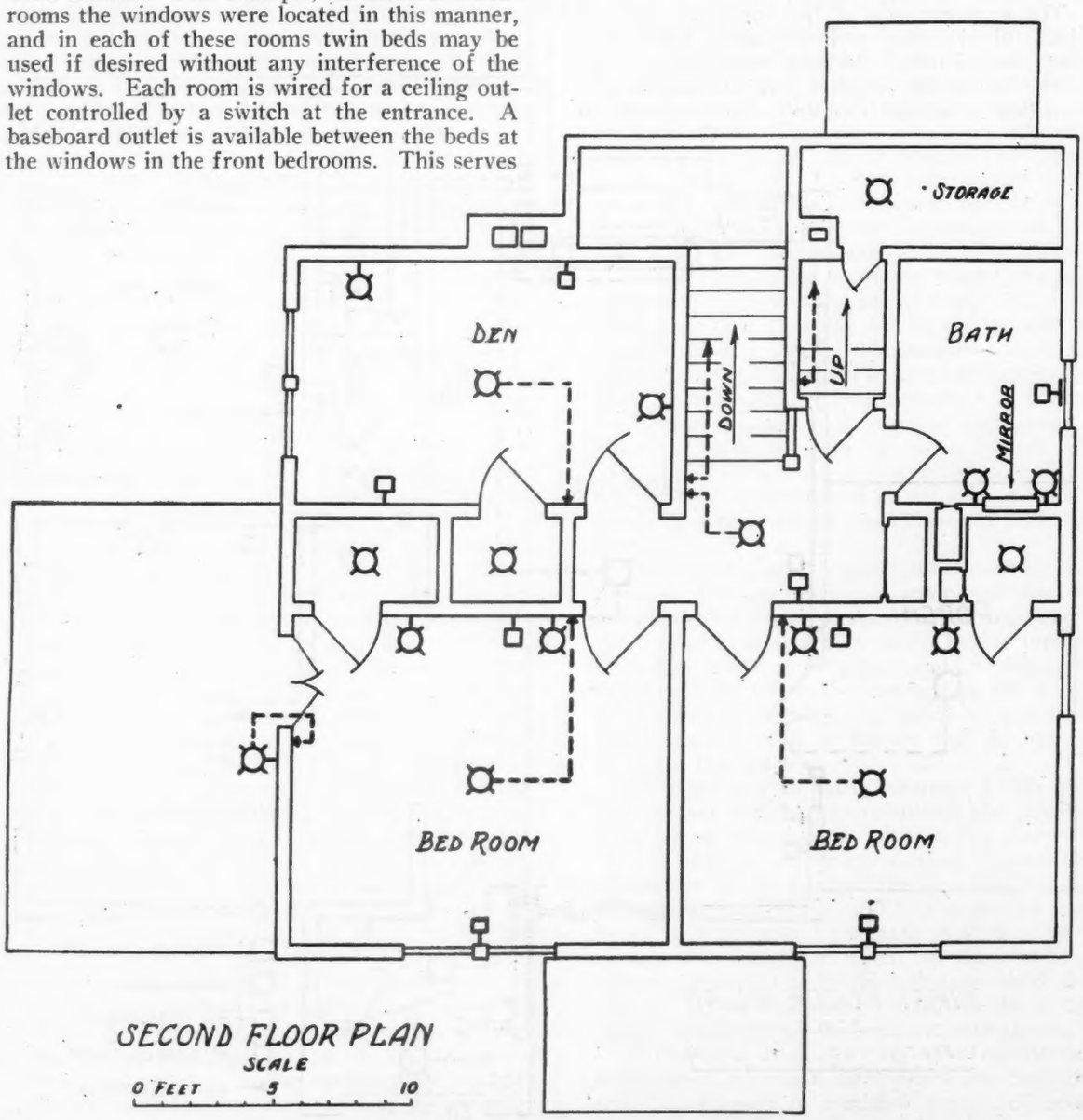


Fig. 2—Wiring Diagram for Second Floor of a Middle-Class Home

installation of this outlet. In fact, outlets may often be justified on the basis of a dual capacity of this character.

In the basement, Fig. 3, the wiring is likewise adequate. A switch near the kitchen entrance to the stairway controls the lamp which illuminates the stairs. A switch at the bottom of the stairs controls a ceiling lamp near the heater and this immediately supplies enough light to make it possible to distinguish any objects in the basement. Above the laundry trays and somewhat to one side is a ceiling socket with a pull-cord snap switch and on the wall is an outlet for connecting a washing machine, a flatiron, or other electrical device. Over the workbench is a pull-chain socket and a similar one is in the toilet. The fuel bin and fruit closet each contain a ceiling outlet controlled by an indicating switch installed in each case outside. These outlets are conveniences which add much to the satisfaction of a basement and make most basements appear

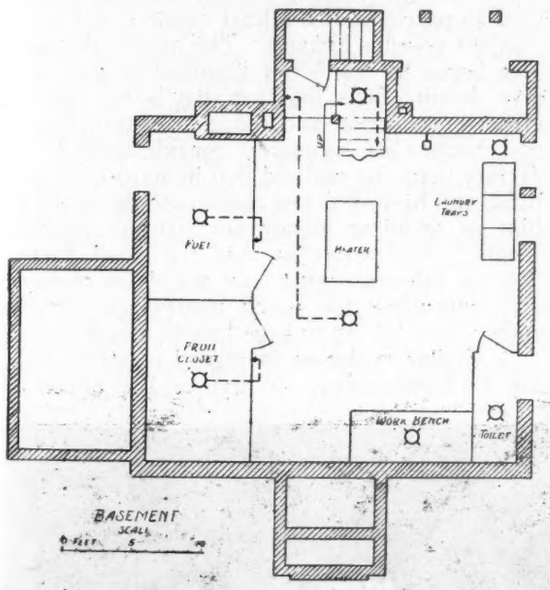


Fig. 3—Wiring Diagram Which Provides Adequate Lighting for the Basement.

by comparison as dingy caves whose chief function is to contribute bumps upon the head and shins of the invader.

Adequate House Wiring Does Not Mean Extravagance.

A comparison of these wiring plans with those of houses costing several times as much would suggest extravagance in this case, but it is confidently affirmed that every outlet and switch has a right to exist. The actual increase in the cost of this adequate lighting plant is an insignificant part of the entire investment. The house possesses possibilities in lighting which are always a source of satisfaction to the householder. One of the best proofs of the justification is that not an outlet or a switch would be given up for several times its cost. These wiring plans are considered adequate, but in no sense extravagant. They represent artificial lighting which ranks third in importance in this house, as it should. It is superseded in importance only by the house or inclosure, and by the heating plant.

By comparing these diagrams with the wiring of the middle-class homes in general, it is evident to those interested in bringing the possibilities of lighting to the householder that each interest in touch with the householder must do his part if this interval between the prevailing inadequate wiring and reasonably adequate wiring is to be spanned.

The next article of this series by Mr. Luckiesh on the subject of lighting and the householder will deal with portable lighting furniture, describing in detail the different kinds and uses of portable lamps. It will appear in the next Lighting Issue of Electrical Review, under date of July 10.

RESISTANCE AND INDUCTANCE BY INTEGRATION METHOD.

Resistance and inductance of conductors are variable quantities depending for their values upon the frequency of the current in the circuit. The variations are small at the low frequencies of commercial power circuits, but are quite large for frequencies of 1000 cycles or more.

These variations have been examined by the Bureau of Standards at Washington, D. C., and an integrating method of deriving the various relations is presented in Scientific Paper No. 374. Data in the paper shows that the resistance of a conductor depends upon its proximity to the return side of the circuit as well as on the frequency. With wide spacings the a-c. resistance of a wire is not affected by the presence of the other wire, while at about 2-in. spacing the effect is noticeable. At close spacing the resistance increases rapidly.

The formulas derived check quite closely with the results of actual experimental measurements. Certain of the values as calculated were slightly in error because too few terms were evaluated in a slowly converging series.

MAGNETIC ANALYSIS TO LOCATE RIFLE-BARREL FLAWS.

In a paper recently prepared by the Bureau of Standards, Washington, D. C., there is described an interesting investigation which was undertaken for the purpose of determining whether an application of magnetic analysis was practicable for the detection of flaws in rifle-barrel steel. By means of apparatus especially constructed for the purpose, a large number of bars were explored for magnetic uniformity along their length. The results demonstrated that the method is amply sensitive for the detection and location of flaws. Further study is necessary to determine to what degree the sensitivity should be reduced in order not to cause the rejection of material satisfactory for all practical purposes.

NEW YORK ELECTRICAL SOCIETY ELECTS OFFICERS.

At the annual meeting of the New York Electrical Society, held at the headquarters of the National Electric Light Association, New York City, June 8, W. N. Dickinson was elected president; George H. Guy, secretary, and Thomas F. Honahan, treasurer. The address of the secretary is 29 West 39th street, New York City.

The Trend of Modern Practice in Street Lighting

Influence of Lighting on Welfare of Municipalities—Improved Appearance of Units—Practice in Connection with Transformers, Mounting Heights, Glassware and Series and Multiple Systems

By W. E. UNDERWOOD

Publicity Department, National Lamp Works, Cleveland, Ohio.

Just as straws indicate the direction of the wind, certain developments or tendencies in street lighting point out what the future installations of street illumination are likely to be and give some hint as to the best way of selling better street lighting.

In the past, the city or town fathers have always looked first and foremost at *cost*. Wherever a penny could be sliced from the street-lighting appropriation they did it with a virtuous feeling that they were serving their community well. As a rule, there was little that the lighting sales engineer could do to combat this attitude, inasmuch as he had no definite facts or figures to prove that better street illumination was worth additional expenditure.

But the old order has changed, and the sales engineer with the new viewpoint on street illumination should be able to make the city council or public service board see that *good lighting* is the primary thing and that cost is secondary.

From a sales standpoint, progress in street lighting is paralleling progress in industrial illumination. As long as the industrial-lighting salesman centered his selling efforts on mere lighting equipment, the factory executive thought only of lamps, reflectors, wire, etc., and endeavored to purchase at the least expense and in the smallest possible amount. The minute the salesman began to talk better illumination and could give definite facts showing that better light increases production and reduces accident hazard, cost became of secondary consideration to the factory man—he realized that he must have good light, and he was at last able to see the profit for him in spending money for lighting improvements. The result is that the good factory lighting salesman must now guard his customer from spending too much money on lighting rather than having to urge him to spend enough.

A similar evolution in regard to street lighting is forthcoming. Wherever the effects of

Installation of Cleveland Lanterns Equipped with 1500-Watt Type C Lamps and Prismatic Refractors.

good street illumination as a safeguard against traffic accidents and against crime are sufficiently impressed upon the civic body which has the power of purchase, there is bound to be a desire for good light and not merely an incentive, as in the past, to buy the least expensive installation with but secondary thought to the illumination obtained.

Relation of Traffic Accidents to Street Illumination.

Some extremely interesting data have been acquired by Ward Harrison and E. A. Anderson bearing on the relation between traffic accidents and street illumination, the conclusions from which are indicated in the accompanying charts. In utilizing the traffic accident information at hand the analysists were presented with the difficulty of taking into account the variation in traffic accidents during summer and winter months as affected by artificial illumination. Their solution is ingenious and logical. Certain hours are daylight periods both in summer and winter, certain other hours represent periods when artificial lighting is necessary both summer and winter, while intermediate hours of the day represent daylight periods in summer and times of artificial lighting in winter. By comparing the accident rates summer and winter under conditions of daylight in both cases and under conditions of artificial lighting in both cases and applying these factors to the accident rates during the period of the day when daylight prevails for a portion of the year and artificial light during the balance of the year, it is found that the average traffic accident rate is 38% higher under

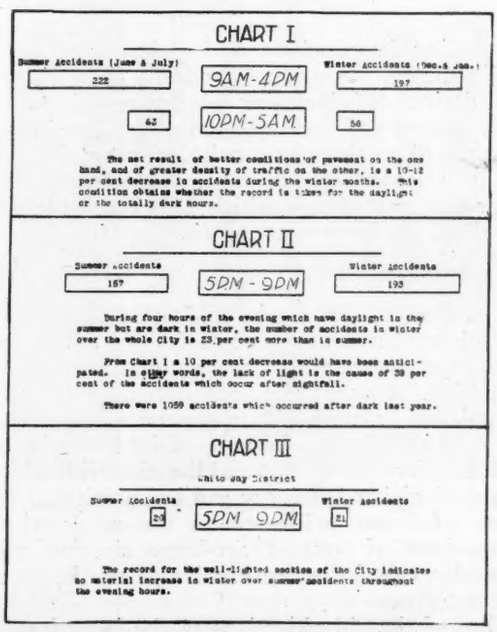


CHART I
Summer Accidents (June & July)
222
9AM-4PM
Winter Accidents (Dec. & Jan.)
197
62
10PM-5AM
58
The net result of better conditions of pavement on the one hand, and of greater density of traffic on the other, is a 10-12 per cent decrease in accidents during the winter months. This condition obtains whether the record is taken for the daylight or the totally dark hours.
CHART II
Summer Accidents
187
5PM - 9PM
Winter Accidents
193
During four hours of the evening which have daylight in the summer but are dark in winter, the number of accidents in winter over the whole City is 23 per cent more than in summer.
From Chart I a 10 per cent decrease would have been anticipated. In other words, the lack of light is the cause of 38 per cent of the accidents which occur after nightfall.
There were 1059 accidents which occurred after dark last year.
CHART III
White Way District
Summer Accidents
23
5PM 9PM
Winter Accidents
21
The record for the well-lighted section of the City indicates no material increase in winter over summer accidents throughout the evening hours.

Charts Showing an Analysis of Yearly Street Accidents in the City of Cleveland.

the usual artificial light than under daylight conditions.

It should be stated further that this analysis was made in two different cities, in both of which street-lighting conditions were above the average of most American municipalities. From the data of the first test and with the data on volume of traffic and lighting conditions in the second city, calculations were made as to the number of traffic accidents which might be expected. It was found that the calculated figures

Incandescent Lamp Unit Equipped with Prismatic Refractor and Inclosing Globe.

agreed quite closely with the actual accident records in possession of the police department.

Incidentally, in getting the accident data in one of these cities it was found that the cost of maintaining adequate fire protection had doubled since 1916, while the outlay for street lighting had increased but 5%.

Street Lighting and Civic Pride.

The tendency in the design of street-lighting equipment is very evidently towards better appearance of both standards and lamps.

The old crooked wooden poles, unsightly lamps, dangling wires and other ugly street-lighting paraphernalia which have been an eyesore in so many American cities will soon be discarded. The manufacturers of street-lighting equipment have for some time been making a particular effort to produce lamps, glassware, standards, etc., in which the artistic as well as the utilitarian aspect is fully considered. As civic buyers are giving more thought than ever before to the appearance of streets, their preference in buying new equipment will be for street lamps and standards that will improve rather than detract from the neat appearance of the street.

Another step in this direction is the manufacturers' improved designs of lamp housings for incandescent street lighting. The first units of this type were very similar to the old arc-light housings. Gradually changes took place in design, such as elimination of the "stove-pipe" effect above the inclosing globe or refractor. Just as the "horseless carriage" was at first a carriage without a horse and gradually came to assume its changed appearance which made it the automobile of today, so the design of street-lighting accessories for the incandescent lamp

have lost their resemblance to the old arc-light accessories and have become truly fitted to the newer lamp. In some of the older installations of incandescent street lamps where they replaced arc lamps the old arc-lamp housings were actually retained. In most cases this has proved false economy.

The fact that the necessary cooling effect for the incandescent lamp could be obtained by

An Ornamental and Efficient Street Lamp Equipped With Glass Canopy.

radiation rather than by ventilation has made possible the present dust-proof units.

The tendency toward placing units at the side of the street instead of over the center of the street has cut down the number of posts or standards required, adding not a little to the better appearance of the installation and actually reducing the cost. As incandescent street lamps came more widely into use, requiring less frequent accessibility than arc lamps for the renewal of parts and for trimming, the tendency has been towards permanent mounting of the units and the elimination of cables and pulleys for lowering the lamp to the street level. This is another step towards better appearance and while it is more difficult, as far as maintenance is concerned, to reach the lamp by means of a special truck or wagon or by means of a ladder, the saving gained by eliminating the extra apparatus for lowering each lamp may often more than offset the added cost of any equipment or time required for the maintenance man to ascend to the permanently mounted lamp.

Eventually street-lighting circuits, like all other circuits, will be underground rather than overhead. This conclusion is obvious in view of the continuously increasing tendency towards "burying" circuits in every good-sized community in this country.

Double-Coil Transformers.

As the higher candlepower incandescent lamps come more and more into demand through their higher efficiencies, there will be an increased need for transformers which, in the case of new installations employing underground series circuits, will probably be installed underground or in the base of the standard and not in the lamp housing. For this reason double-coil transformers which will insulate the lamp and standard from high voltage will be favored over the single-coil or auto-transformer.

Mounting Heights.

The proper mounting height for street-lighting units has been a much-mooted question. Lamps have been mounted as low as 8 ft. and some of the old arc towers are well over 100 ft. high. Where lamps are mounted on standards or poles there must be a compromise between the greater illumination spread of high mounting and the added cost of larger and higher standards or posts. There is, however, the additional point to be considered of glare or "blinding effect." Street lamps at low mounting heights are directly in the line of vision of the vehicle driver, so that the glare is extremely trying. At very low mounting heights it is almost impossible for the car driver to see any dark object beyond the nearest street light.

Consideration of "blinding effect" will very likely offset any future tendency towards very low mounting heights, and it is to be expected that the engineer will consider the three factors, spread of light, blinding effect and cost of standards or poles, in arriving at the mounting height for any particular installation.

Improvements in Glassware.

Refracting glassware for use with incandescent street lamps has been steadily improved, and the new rippled and stippled inclosing globes are finding favor where opal globes were practically the only previous standard. The shapes and designs of inclosing glassware of recent manufacture are decidedly more pleasing in appearance than the older units. There are also the new lanterns in hexagonal, octagonal and other tasteful shapes which will meet the demands of the most exacting civic art critic.

Incandescent Versus Arc Lamps.

The comparative merits and disadvantages of incandescent and arc systems for street lighting have been discussed too many times to warrant repetition. However, it seems probable that the incandescent system will, in general, be preferred for new installations because of its lower initial cost, smaller upkeep cost and the ease with which lamps of higher brilliancy can be substituted for those of lower brilliancy as the need arises. Extensions of present arc-lamp circuits will naturally call for more arc lamps of the more efficient types.

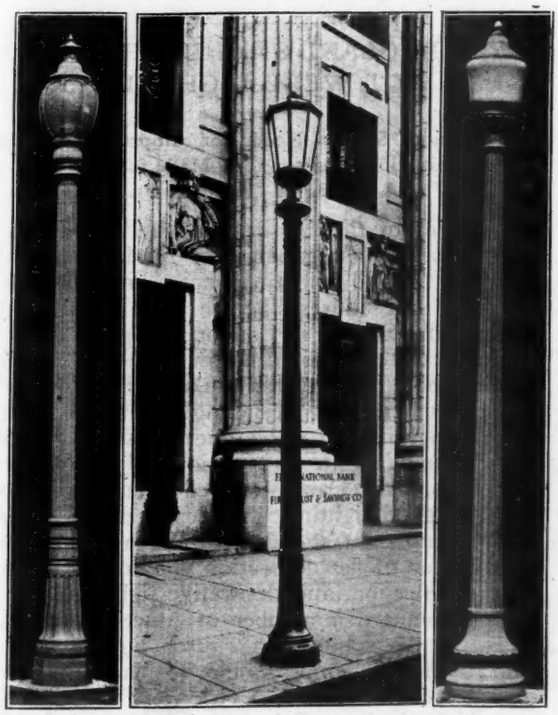
One of the old objections to the incandescent lamp where high candlepower units were required has been entirely removed by the production of series incandescent lamps of as high or higher candlepower than any existing standard arc lamps. Only a few years ago it was necessary to use clusters of series incandescent lamps where high candle-power was desirable with this system of lighting. The so-called "white way" lighting by means of clusters is an example. Today the 1000-watt street series incandescent

lamp with a brilliancy of nearly 2000 candlepower is in quite common use, and incandescent lamps of even greater candlepower are entirely practicable from a manufacturing standpoint.

Multiple and Series Systems.

There is much to be said in favor of the multiple system of street lighting, although this system is as yet little used in this country. The series circuit requires special central-station apparatus that is apart from the rest of the entire central-station power and distributive equipment, which is designed for multiple circuits. Developments which would permit the use of street lamps on the regular commercial and residential lighting circuits would be of considerable value. The high cost of underground high-tension construction is one great reason in favor of low-tension multiple street lamps, while the ease with which multiple street-lighting extensions might be made, the added safety of low-tension lines, and the lower cost of fixtures and accessories, are all additional advantages of the multiple circuit.

The great difficulty, as far as adopting multiple-circuit street lighting is concerned, lies in the control of the street lamps when these are



Types of Single-Unit Lighting Standards, the Cleveland Lantern Being Shown in the Center.

tapped off the various commercial or residential lighting circuits. It would be possible to turn the lamps on or off by hand, which would require that each circuit be patrolled twice each day as in the old days of gas and oil lamps. Control of this sort is, however, extremely bothersome and the labor is frequently hard to obtain.

Not a little experimentation has been carried on in developing remote control for multiple-circuit street lamps. Among the proposed systems are the "cascade" control, pilot-wire control of relay switches, impulse systems employing the "winking" of circuits or change of frequency, and finally the automatic clock control.

Out of some one or more of these ideas we may possibly expect the development of a control system for multiple-circuit street-lighting equipment which might eventually be adopted generally. However, it is unlikely that series street lighting will become extinct until many years have passed.

Street-Lighting Installations of the Future.

The last ten years have brought so many changes and improvements in street lighting that one cannot with any degree of certainty prophesy what advance will occur even in the next few years. We can, however, be certain that the public, manufacturers of street-lighting equipment and lighting engineers will look upon street lighting hereafter from the viewpoint both of pleasing appearance and of illumination efficiency. It has been demonstrated in the present modern street-lighting equipment that beauty of design and illumination efficiency can be combined, and there is every reason to believe that the architect, the designer, the engineer, the manufacturer and persons interested in civic improvement will all have a share in bringing about still greater harmony between beauty and practicability of the street-lighting equipment and installations of the future.

ORIGINAL ARC-LIGHT MACHINE IS STILL IN EXISTENCE.

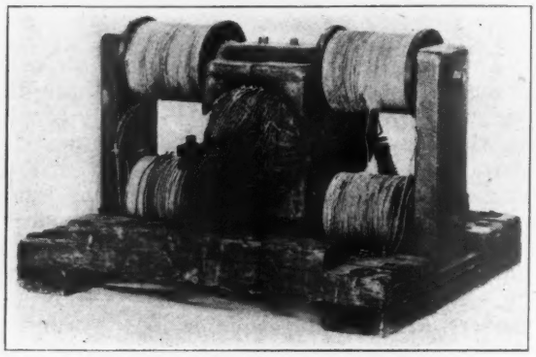
First Arc-Light Generator, Built in 1879, Is Preserved in Lynn, Mass., as Relic of the Electrical Industry.

By C. D. Wagoner.

One of the first important inventions of Prof. Elihu Thomson was his arc-lighting dynamo, built in 1879. This machine formed the basis of the successful lighting system put on the market by the Thomson-Houston Electric Co. It was built entirely by Prof. Thomson, who made the patterns, had the castings made, built the frame, made the field bobbins and wound them, also wound the armature, made the connections thereto and all the machine parts of the dynamo itself. It weighed about 350 lbs., including the base, which was made of planks bolted together. It will be noted from the accompanying illustration that the field castings consist of two yoke pieces at the end, to which are bolted the horizontal field cores, four of which were used to save making a more complicated pattern. The two upper and the two lower field poles, which meet in the center, are tied together by pieces of hard wood bolted to them. For lack of machine facilities, there was no boring or turning of the field or armature, and the end yoke pieces were fitted to the cores by chipping, no planer being available. One of the curious mechanical features of this machine is the cast-iron boxes receiving the shaft, which, strange to say, worked without heating during the running of the machine.

The construction of the machine was started in the fall of 1878 and by the end of the year it was ready to operate. In some respects it was unique. It really was a machine which could

be coupled so as to give varying voltage and current. There were four field coils which could be connected in series or in series-multiple, or all four in parallel so that the virtual section of the wire could be made one, two or four. The same construction was adopted in the armature winding, there being four separate wires in each of the two coils, which are clearly shown cross-



The First Arc-Light Generator.

ing each other at right angles. The commutator and a connection board are on the opposite end of the machine from that shown in the illustration. The commutator consists of four half-circles arranged in two rings, one ring being provided for each of the two armature coils. The brushes, through the commutators, connected the two coils in series, thus producing a d-c. supply.

The armature core, on account of the difficulty of getting sheet-iron plates, was made by assembling a number of thin, soft castings the projecting portions of which are seen as arcs of circles between the windings. The armature coils fell into the deep grooves between these projections. The four rings between these bearings and the armature core are collector rings used when the machine was operated as a two-phase generator.

Experiments were made with the alternating currents supplied by the machine, and it is a noticeable fact in this connection that this machine was used early in 1879 to supply transformers from its a-c. side. Two shell-type transformers with small-wire primary and heavy-wire secondary windings were built and used to operate small vibrating arc lamps and to supply energy for other experimental purposes. The machine was first operated at the Franklin Institute, Philadelphia, Pa., where there was a 6-hp. engine of the single-cylinder, upright type. Power was by no means so easily obtained in those days as now. There were no such things as gasoline or oil engines, and even gas engines were somewhat rare, while steam power was only to be found in factories and buildings where a power plant with boilers and engines had been installed for other uses. The Franklin Institute, however, had this engine which was made available for the work in connection with Prof. Thomson's dynamo. It was the witnessing of the operation of this machine, crude as its construction was, that led two Philadelphia gentlemen to become interested in developing the arc-light machine and lamps, which afterwards became known as the Thomson-Houston arc-lighting system.

Steps taken shortly after the early demonstrations led to the development and construction of a much larger three-phase machine which had its three coils Y-connected. The current from this machine was rectified by means of a three-segment commutator. This second machine was built for four lamps, each being operated from a separate circuit supplied with about 20 amperes at 60 volts from an individual commutator. Within two or three months after completion three of the four commutators were discarded. The wiring, by a sort of prevision, had been made double on the armature and so connected in series that a series circuit of as many as nine arc lamps could be operated successfully, the voltage of the machine being something over 500 as a maximum. It was this large machine, the second constructed, and of a unique type itself, which really laid the foundation of the business of the Thomson-Houston Co., which grew to such large proportions in the years following.

The original machine, which is now in Lynn, Mass., at the plant of the General Electric Co., is in a somewhat dilapidated condition, but stands as a monument to the electrical industry and to its builder.

SAYS ENGLAND'S CHURCHES ARE NOT WELL LIGHTED.

Investigation Shows Need for Improvements in Illumination—Suggestions Made for Better Lighting of Churches.

A survey of the lighting of churches in England reveals a disregard of the fundamentals of principles of illumination, according to John Darch in an address before the Illuminating Engineering Society in London in April.

The architect should know that in church lighting there is more than the matter of "points" and the selection or designing of fixtures. Incorrect lighting may be due to shortage of church funds or to self-opinionated committees or donors. Mr. Darch touched upon the attractions of good lighting, the pleasures and pains of light and sight, the claims of architecture, the illumination of flat decoration, the importance of diffuse reflection, and decorative lighting.

He submitted a number of practical suggestions for the solution of church lighting problems: (1) The lamps should be placed so they do not occupy the field of vision; (2) the illumination should be sufficient and so arranged that the objects shall appeal readily and truthfully to the eye and so that perception may become a pleasure; (3) the illumination in the pews should be sufficient in intensity and convenient in direction; (4) the color of the light should approach white as nearly as may be obtainable; (5) separate local lighting should be provided for the pulpit and wherever the general lighting is insufficient; (6) provision should be made to subdue the general illumination during the sermon or when required.

In considering the choice of methods Mr. Darch divided them into six classes—four direct lighting and two indirect. The bewildering variety of arrangements, character and detail to be found in churches render it useless to

prescribe any one of these six methods for any particular class of building. Before adopting either or any combination a careful study should be made of the church in question, its plan, its roof, its architectural details, its seating arrangements, and the color of its walls and ceiling, all of which will profoundly affect the problem of its successful illumination. The speaker considered, in turn, exposed low-level lighting, shaded low-level lighting, overhead direct lighting from ceiling or roof, concealed direct lighting, indirect lighting from opaque bowls containing concealed lamps and reflectors, and indirect lighting from concealed positions.

In regard to pulpit lighting he suggested that neither the lamps nor the inside of the reflectors to be exposed to view, that the preacher's face to be about 4 foot-candles, and that the switch so that every expression is observable, that the reflectors to be well clear of the preacher's head but not too far for economy of lighting, that, in the interest of the preacher, the light to be outside his angle of vision, that the paper gloss angle to be avoided, that the desk illumination to be about 4 foot-candles, and that the switch for the desk lamp arranged to be operated from the pulpit.

After discussing porch lighting and the logic of fixtures, Mr. Darch said the conclusion of the whole matter was that the present methods of lighting churches in England were bad and as out of date as the use of candles and gas flames for which they were designed. "They are offensive and injurious to the eye, they defeat their own object by reducing visibility, and certainly help to empty the churches." Now that sound principles of illumination have been established those principles should govern every installation. The modern illuminant which has come to stay should be handled in a manner suitable to its character and the church made as attractive and comfortable as a theater or a public library with pleasing lighting and easy visibility and efficient heating and ventilation.

LAMP VOLTAGES GRADUALLY BEING REDUCED TO STANDARDS.

Large Percentage of Lamps Demanded Now Are of Only Three Voltages—Other Voltages Are Losing in Favor.

The tendency towards standardization in electrical equipment is well illustrated in the demand by voltages for lamps. Approximately 85% of all lamps sold during 1919 were within the range of 110 to 125 volts. In a total of over 170,000,000 lamps sold in that year, 84% were of the vacuum type and 16% were of the gas-filled type, the latter supplying 42% of the candlepower of the year's sales.

The accompanying chart, submitted as part of the report of the lamp committee of the National Electric Light Association, shows in a clear manner how the demand by voltages has varied during the past seven years. The percentage demand of 110-volt lamps has remained practically constant with slight variations from year to year, while the demand for lamps rated at 115 and 120 volts has grown steadily and rapidly. Lamps rated between 100 and 109 volts have fallen in demand to practically zero, while lamps rated between 126 and 130 volts have amounted steadily to about 1.25% of the entire sales. The 112-volt class, which originally was second only to the 110-volt class, has decreased steadily to fourth place in demand. The only lamps to show an increase aside from the three principal classes are in the 125-volt class. This class has come up from almost zero to between 5 and 6% of the entire demand.

The increase in the percentages of use of the two most rapidly growing classes is made up from the falling off of the other classes. This falling off in percentage does not mean in all cases that there are actually fewer lamps used, but rather that the particular lamp has not increased in proportion to the increase in the lamp business. In some cases there is, in fact, an

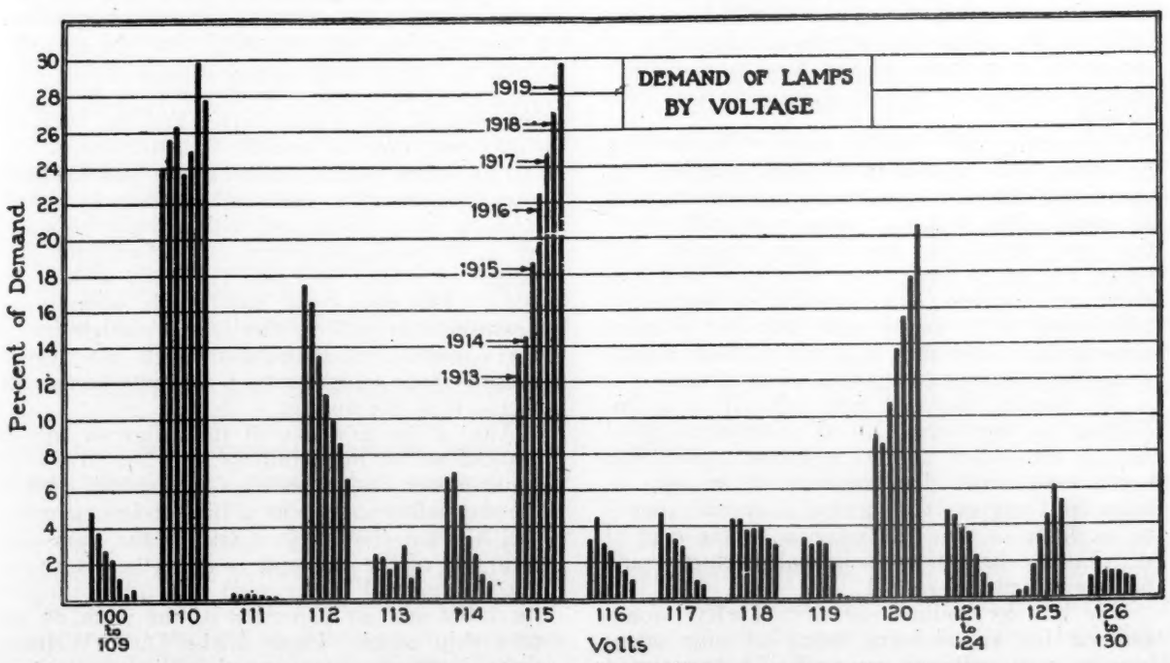


Chart Showing the Tendency Towards Standardization in Lamp-Voltage Demand.

increasing number of lamps of a given type used while the percentage is shown to decrease.

An analysis of this chart shows how, ultimately, the service voltage employed is being reduced to one or two fixed standards by a process of elimination. It is evident that the greater portion of new equipment being manufactured is for either 115- or 120-volt service and that in time all other voltages will be reduced to a negligible position, with the possible exception of the 110-volt class.

MEASUREMENT OF RADIATIONS FROM SUN AND QUARTZ LAMP.

A new instrument, called the spectropyrheliometer, which has been devised by the Bureau of Standards, Washington, D. C., is used for the measurement of ultra-violet radiations and in determining the opacity of materials to such light or radiations. The spectropyrheliometer consists of a quartz spectrograph and cylindrical condensing lens, placed upon an equatorial mounting. In this manner the ultra-violet absorption in heliostat mirrors is avoided.

In Scientific Paper No. 378, descriptive of this instrument, information is given relative to the infra-red, visible and ultra-violet radiations from the sun and from quartz mercury-vapor arc lamps. Other information is also given relative to radiations from gas-filled tungsten lamps and from iron and carbon arcs.

E. N. HURLEY DELIVERS ADDRESS TO ADVERTISING MEN.

Urges Passage by Congress of a Bill to Provide Means for Determining Distribution Cost of Manufactured Products.

"Merchants must figure advertising cost in their budgets as an expense just as rent or labor, charging it against each product and article," declared E. N. Hurley, chairman of the board of directors of the Hurley Machine Co., Chicago, in the course of an address delivered at the annual convention of the Associated Advertising Clubs of the World at Indianapolis, Ind., June 8.

Continuing, Mr. Hurley said: "Advertising has been hurt by emotional appropriations, by spasmodic flares. It is today a necessity and an asset. For instance, some men still advertise only when they have spare money, and never put out a line when times are dull and they need business. The amount and nature of advertising is to be planned with the production scale. Only then can we stabilize manufacturing, merchandising and advertising."

Mr. Hurley declared that today it is as important to know the cost of distribution as it was a few years ago to ascertain production costs, and urged that pressure be brought to bear on Congress calling for a special survey to be made so that the question of the cost of distributing the nation's principal products could be ascertained and settled.

The bill, as outlined by Mr. Hurley, would provide for an advisory board of nine members to serve without pay and to be appointed by the United States Secretary of Commerce, consisting of representatives from such organizations as the Associated Advertising Clubs of the World, leading trade paper, magazine and newspaper publishers' associations, and jobbers' and retailers' associations. This board would co-operate with the Secretary of Commerce and the Director of Census in preparing questionnaires, suggesting data required, and in other matters on which they might desire advice. There are many problems involved in this question, and with the compiling of such data by the government the information could be quickly analyzed and given to the public at an early date.

This census would endeavor to collect and tabulate such information as the following:

1. Volume of wholesale sales (a) by lines of merchandise and (b) by cities and states.
2. Volume of retail sales (a) by lines of merchandise and (b) by cities, counties and states.
3. Costs of distribution charged to broker, to wholesaler, to retailer, to transportation, to advertising, etc., (a) by lines of merchandise and (b) by states.
4. Census of retail outlets.
5. Consumption statistics (a) in money, (b) in volume of goods, (c) by lines of merchandise and (d) by cities, counties and states.
6. Distribution from industry to industry of (a) completely manufactured products, (b) semi-manufactured product and (c) raw materials.

NIAGARA INDUSTRIAL DISTRICT TO HOLD CONGRESS.

Development of Canadian Side of Niagara River to Be Shown Manufacturers and Other Interested Parties in August.

The Canadian municipalities comprising the Niagara District Industrial Association will hold a three-day congress, Aug. 2-4, to which invitations are being sent to manufacturers in all parts of the country with the purpose of having the manufacturers visit the territory and consider it as a location in the event of the establishment of Canadian branch factories.

The cities of Niagara Falls, St. Catharines and Welland, Ont., together with the smaller towns in the district, are sponsors for the congress and a program has been arranged that will give the visitors every opportunity to study at close range the great water-power development in the Canadian side of the Niagara river and the Welland ship canal, now in process of construction.

This canal, which parallels the old Welland canal, will be 25 mi. in length, with locks 800 ft. long, 80 ft. in width and with a depth of water of 30 ft. over the mitre sills at extreme low stages of water in Lake Erie and Lake Ontario. The new canal will enable ocean-going steamships as well as the largest freighters on the Great Lakes to pass through the canal, making cheap freight rates a certainty for manufacturers in the district.

Aug. 4, the first day of the congress, will be devoted to an inspection of the Niagara Falls water-power development. On Tuesday, part of the day will be spent in a further inspection of the Niagara river with a trip to the Lake Ontario end of the Welland canal in the afternoon. Wednesday will be occupied with a trip through the canal and an inspection of the work on the new ship canal. Louis Blake Duff, Welland, Ont., is the secretary of the Niagara District Industrial Association.

EDITORIAL COMMENT

The Defeat of the Water-Power Bill

Once more the water-power bill is defeated, the will of the populace is thwarted, the march of intelligent progress is arrested. By marshalling an indisputable array of facts and logic, the advocates of constructive statesmanship succeeded finally in impressing the importance of the legislation for which they were working on the legislative branch of the government. It seems, however, that they were unable to pilot its important aspect through the intricate mazes of the White House corridors. At all events, the water-power bill received the overwhelming sanction of Congress, but was defeated by the failure of the President to attach his signature. Water-power legislation cannot, therefore, become effective until Congress again acts on it; and Congress probably will not act until the usual amount of urging is done by the advocates of the law.

So much has already been said about price and shortage of fuel and about the desirability of water-power development as a relief to the fuel problem that almost nothing remains to be said or done but to develop and use the power at hand. The real issue at this time is whether water will be wasted for a few more months or years or whether it will be used now and saved. The water that flows down the mountain side, while we stand by and argue, can do no work and saves us none of our vanishing and costly supply of fuel. It is only a short time until the country's water power will have to be developed regardless of differences of legislative and executive opinions. After the required laws are passed the problem becomes one of engineering and finance, which, after all, will govern in the end in spite of any artificial hindrances that may be interposed temporarily.

It seems strange to think that, in a nation in which the ability to think intelligently and act wisely is a vaunted attribute, evidences of the attribute are not more generally conspicuous in the activities of its government. The statement has been made frequently that the government represents, with considerable accuracy, the thought and will of the governed. Upon reviewing the almost uninterrupted series of comic and tragic events that have occurred in Washington during the past several years, however, one is inclined to disbelieve the statement. The failure of the water-power legislation is one of the most conspicuous bits of evidence that can be mentioned in support of the inclination.

Only one thing remains to be done to get this legislation on the statute books where it belongs, and that is to keep working for it. In this work the effort of technical men is supremely important. Equipped with an understanding of the desirability of utilizing natural resources and the value of enforcing intelligent conservation, they can, more advantageously than any other group of men, attack the politicians in their most vulnerable spot with certain assurance of undoing them. This spot is on the forum. Let engineers begin a campaign of publicity for the water-power or any other similar measure and the bulwarks of politics will begin to tremble. This is illustrated by the accelerated progress made by the water-power and public works department bills. They are not yet laws. But since engineers began advocating them, they have made much more rapid progress than they made previously.

To repeat the work involved in getting the water-power legislation enacted may seem arduous to some. It is not pleasant for any of its advocates to contemplate. But it is necessary if the legislation is to be enacted. The good citizen will fight for good laws. And engineers are good citizens.

A Brief for More Residence Outlets

One reason for the backwardness of residence lighting, as we actually find it in the average home, is the relatively small number of outlets, which presents to a large degree the attainment of variety in lighting effects. This scarcity of outlets has been commented on in these columns on several occasions and it has frequently been mentioned in the series of articles on residence lighting written for the ELECTRICAL REVIEW by Mr. Luckiesh. He has repeatedly shown that the availability of numerous and convenient outlets permits readily changing the usual monotonous lighting into many charming lighting effects.

In the sixth article of this series, which appears in this issue, Mr. Luckiesh drives this point home and emphasizes it by showing typical floor plans of a home in which ample outlets were insisted on, in spite of the astounding suggestion of the contractor that they be reduced in number. Their great utility has repeatedly

been demonstrated and has put to scorn the shortsighted advice of the contractor.

If this were an isolated case it might be passed over, but as a matter of fact it is too common for electrical contractors even in this late stage of electrical development to cling to the apologetic attitude of trying to shave off the price a little here and there. When the public was still very lukewarm on electric service in the home and had to be coaxed to permit houses to be wired at all, there was some reason for making the installation of the wiring at the lowest possible figure, even though this involved cutting the installation to a mere skeleton of what it ought to be. The other reason so often advanced, namely, that the price had to be trimmed down else a competing contractor would get the job, we have never accepted as a legitimate one. There was no sense in the continual fear of what a competitor might do; it resulted only in cut-throat competition and should have been banished by manly co-operation long ago.

If a plentiful supply of outlets was of advantage to proper lighting alone, this would be ample reason for urging that outlets be provided abundantly. However, every wall outlet, especially of the receptacle type, and every floor outlet constitutes another very convenient means of using electric fans, heaters and the other numerous household electrical appliances. In fact, the use of such appliances, just as with lighting, is now commonly hampered by the dearth of convenient outlets.

This promotion of more outlets must not be left to contractors or contractor-dealers alone. It can be helped very materially by manufacturers of appliances, portable lamps and receptacles by using in their national advertising, in leaflets and in other mediums that reach the general public illustrations of appliances and portables connected to wall and floor receptacles instead of to ceiling and bracket fixtures. Fixtures are designed for and should be used for lighting. It should never be necessary to remove a lamp therefrom in order to find means for connecting a portable or appliance. Receptacles are designed for this latter purpose and should always be available therefor. Failure to boost receptacles and more outlets in general is only shortsightedness. Let there be an end to this folly.

Publicity for Public Utilities

The method adopted by the New Orleans Railway & Light Co. to acquaint its customers with the difficulties that confront it is commendable and represents a policy of open dealing that is sure to win their confidence. The method consists of inserting small and terse advertisements in the daily newspapers of New Orleans that have a human appeal to the readers and at the same time contain a message that discloses the unfavorable conditions under which the company is operating. The copy for these little advertisements, which is never repeated and which occupies fixed positions in the different papers, tells a different story every day. The interesting thing about the story is that it is the truth, a fact that is beginning to be recognized by the readers and that is beginning to create a sympathetic public attitude.

Ignorance always breeds discontentment in one form or another. The more quickly this fact is recognized, the more certainly can the discontentment be averted. To affairs and enterprises that affect the public, the truism is particularly relevant. It is said that a workman always suspects an order or command, the significance of which he doesn't understand. It requires no unusual stretch of imagination to comprehend the fact that the mental process of the individual may as well be that of the multitude. There need be no surprise that the public is suspicious of a utility company with which its only point of contact is a monthly bill with a penalty for nonpayment on a certain date. What reason has the customer for thinking that he is not being overcharged or that the utility company is not making inordinate profits, or that the value of the electricity is as large as it should be if he has sufficient intelligence to understand such specifically technical terms?

But why shouldn't the customer know something about the reputation and standing of the company with which he deals, the cost of manufacturing the electricity he uses, and about such a term as "kilowatt-hours"? Were he purchasing clothes for his family, the reputation of the dealer from whom he intends to purchase, the make of the goods to be purchased, and the material in them, would constitute decisive factors in enabling him to determine when, where and what he would buy. In years past utility companies pursued the mistaken policy of confining their publicity to the distribution of bills for service rendered. Before they realized their predicament, they found themselves subject to the biased attitude of an ignorant public, and biased largely because it was ignorant. Now, while the bias is particularly oppressive, an educational campaign must be conducted before relief can be obtained. The earlier it is started the more immediate the relief. Already, after a comparatively brief publicity campaign, the New Orleans company reports a changed and much more sympathetic public opinion than existed previously. Why not?

CURRENT EVENTS

Reports of Important Meetings, Developments and Other Happenings of the Electrical Industry and Its Allied Interests

PRESIDENT WILSON FAILS TO SIGN WATER-POWER BILL.

Years of Work on the Part of Electrical Industry, Congress and Other Interests Halted by Executive's Failure.

The national water-power bill which recently was passed by the House of Representatives and the Senate by large majorities, to the great satisfaction of men interested in the electrical and other industries, who had worked for years to obtain the passage of such a bill, has suffered what is called in Washington a "pocket veto" by President Wilson.

In other words, when the bill was presented to the president for his signature, the final necessary step to make it a law, the chief executive simply failed to sign it and up to the present time has given no reason for his failure to act, except one voiced through Secretary of the Interior John Barton Payne to the effect that government lands were not properly safeguarded in the bill.

While President Wilson's action in killing the bill by a "pocket veto" has been generally condemned in Washington, open criticism so far has only been expressed by Senator Jones, of Washington, chairman of the Senate committee on commerce, who described the president's action as "little short of a calamity to the country."

"With the imperative need of conserving coal and oil and the great demand for power for manufacturing and transportation, it is hard to conceive of the objection that can justify the defeat of this legislation," said Senator Jones. "The price of coal and oil will continue to soar, production will be curtailed, and our great inexhaustible resources will remain idle and undeveloped."

The result of the failure of the president to sign the bill will mean that the vast amount of work entailed in getting the bill through both branches of Congress will have to be done all over again at the next session and with the best possible efforts and speed that can be brought to bear it will be at least a year before work of development of water-power resources under the provisions of the bill can be started.

INTERNATIONAL CO-OPERATION IN ILLUMINATING ENGINEERING.

British Society Sees Opportunities for Advancement in Lighting Art Through United Effort of International Interests.

In its annual report the council of the Illuminating Engineering Society (London) says that one gratifying sign of the restoration of normal conditions in regard to illuminating engineering has been the recommencement of international co-operation. Before the war the society derived great benefit from the assistance of its corresponding members in various parts of the world, but during the war this co-operation was checked. Lately on several occasions valuable contributions to the discussions have been received from abroad. An opportunity will shortly arise for recommencing the work initiated several years ago on such subjects as industrial lighting, a matter which, it is felt, especially deserves international treatment.

The renewal of the work of the National Illumination Committee in England will doubtless prove an indication of the restoration of the International Illumination Commission which came into existence a few years before the war. The Japanese Illuminating Engineering Society continues to make progress. The council recognizes that the Illuminating Engineering Society in the United States has been continuing its work with its usual energy and mentions in its report that there are now six states which possess codes of industrial lighting. It adds: "There should therefore be many opportunities for fruitful co-operation between these various bodies in the advancement of illumination."

Among subjects to be dealt with at an early date by the English society are ship lighting and the use of light in aerial navigation.

NEW YORK STATE CONTRACTORS TO HOLD CONVENTION.

Electrical Dealers Association Arranges Long Program of Papers on Subjects of Interest to Trade for Discussion.

An attendance of 500 members is expected at the annual convention of the New York State Association of Electrical Contractors and Dealers to be held at Utica, N. Y., June 24-25, with headquarters at the Hotel Utica. While the program has not been completed the tentative plans call for the presentation of many papers of interest to the members of the organization.

The convention will be opened with a meeting of the executive committee on the morning of June 24, followed by a two-hour session on business conditions, which will be participated in by members from all parts of the state.

At the afternoon session James R. Strong, past president of the National Association of Electrical Contractors and Dealers, will read a paper on "The Progress of the New York State Association from the National Point of View." Another paper at this session will be on "The Effects from the Central-Station's Viewpoint of Co-operative Selling Campaigns," by T. E. Steel, vice-president of the Utica Gas & Electric Co. There will also be a paper on "Modern Methods of Estimating and Figuring Overhead

Costs," by a speaker yet to be selected, and a report of the activities of the national association by W. H. Morton, general manager of the association, at the afternoon session.

On June 25 A. A. Anderson, Albany, N. Y., will present a paper on "The Results of Years of Co-operation Between Central-Station Companies and the Contractor-Dealer." There will also be papers on "The Immediate Future of the Electrical Industry," and on "Trade Conditions," by speakers to be named later, while H. B. Kirkland and Samuel A. Chase will speak on subjects to be selected by themselves. The business sessions of the convention will close with a discussion on "Scientific Merchandising," led by William L. Goodwin.

The annual banquet will be held on the evening of June 24 and will be followed by an illustrated lecture by Solomon Davis, past president of the New York state association, who will tell of his recent travels in Japan. The membership of the New York state association has increased from 140 members to approximately 550 in the past two years and responses to invitations indicate that fully 500 members and guests will attend the convention.

SUPPLY MANUFACTURERS ARRANGE LONG PROGRAM.

A program that will keep the members busy for three days has been arranged for the summer meeting of the Associated Manufacturers of Electrical Supplies at New London, Conn., June 28-30, with headquarters at the Griswold Hotel. The schedule as arranged calls for section meetings on each of the three days as follows:

On June 28 there will be meetings of the following sections: air circuit-breaker, outlet box, armored conductor, rigid conduit, non-metallic conduit, wire and cable, and weatherproof wire. On June 29 will come the meetings of the industrial lighting, heating and appliance, fuse, molded or formed insulation, lamp receptacle and socket, attachment plug, snap switch, and carbon sections, followed on June 30 by meetings of the signalling apparatus, knife switch, and panelboard and switchboard sections.

On the evening of June 28 there will be a general meeting of the members at which addresses will be made by men prominent in the electrical industry. The board of governors will meet on June 29, while the general standards committee and other committees will hold meetings during the sessions.

NEW OFFICERS NAMED BY NATIONAL RESEARCH COUNCIL.

Organization to Have Permanent Home in Washington Through $5,000,000 Endowment Received from Carnegie Corp.

The National Research Council, a co-operative organization of the leading scientific and technical men of the country for the promotion of scientific research and the application and dissemination of scientific knowledge for the benefit of the national welfare, has elected the following officers for the year beginning July 1, 1920: Chairman, H. A. Bumstead, professor of physics and director of the Sloane physical laboratory, Yale University, New Haven, Conn.; first vice-chairman, C. D. Walcott, president of National Academy of Sciences and secretary of Smithsonian Institute, Washington, D. C.; second vice-chairman, Gano Dunn, president of J. G. White Engineering Corp., New York City; third vice-chairman, R. A. Millikan, professor of physics, University of Chicago, Chicago; permanent secretary, Vernon Kellogg, professor of biology, Leland Stanford University, Stanford, Cal.; treasurer, F. L. Ransome, treasurer of National Academy of Sciences, Washington, D. C.

The council was organized in 1916 under the auspices of the National Academy of Sciences to mobilize the scientific resources of America for work on war problems, and was re-organized in 1918 by an executive order of President Wilson on a permanent peace-time basis. Although co-operating with the various government scientific bureaus, it is not controlled or supported by the government. It has recently received an endowment of $5,000,000 from the Carnegie Corp., part of which is to be expended for the erection of a suitable building in Washington for the joint use of the council and the National Academy of Sciences.

POWER PRODUCTION SHOWS BIG THREE MONTHS' TOTAL.

Electrical Energy Developed for First Three Months of 1920 Gives Production Figures of 11,114,845 Kw-Hrs.

During the first three months of 1920 the total production of electric power in the United States was 11,114,845 kw-hrs., according to figures compiled by the division of power resources of the United States Geological Survey. Of this total. 3,857,275 kw-hrs. was produced by water power and 7,257,570 kw-hrs. through the consumption of coal, fuel oil and natural gas.

Of the electric power produced by water power New York State leads with 678,533 kw-hrs., with California second with 519,240 kw-hrs. produced. Montana and Washington were the only other two states to produce more than 250,000 kw-hrs. from water-power resources.

In the production of electric power by fuel consumption New York state also led with a total of 1,049,629 kw-hrs., with Pennsylvania in second place with 950,182 kw-hrs. Illinois stood third with 747,129 kw-hrs., and Ohio fourth with 745,199 kw-hrs.

In addition to the 519,240 kw-hrs. produced by water power, California also produced 317,465 kw-hrs. without burning a ton of coal, the fuel used being petroleum, or its derivatives, and natural gas.

EDISON OFFICIATES AT UNVEILING OF MEMORIAL TABLET.

Thomas A. Edison officiated at the unveiling of a bronze tablet, in honor of men from the Edison industries in the United States who lost their lives in the world war, at the Edison plant, West Orange, N. J., on May 28. The tablet is located on the south wall of the laboratory at

the works and reads: "World war. This tablet erected and dedicated in memoriam to the employes of Edison industries who gave their lives in the cause of humanity. Erected by Edison Industries Post No. 210, American Legion, through popular subscription of employes of the Edison Industries, May, 1920." The ceremony was witnessed by about 5000 employes of the company. Approximately 800 of the company's employes served in the war, about 100 losing their lives.

MISSOURI MEN ARE OPTIMISTIC ON UTILITIES FUTURE.

Expression of Opinions at Fourteenth Annual Convention Indicate Belief That Peak of Troubled Times Has Been Passed.

Optimistic views as to the future, coupled with a feeling that the difficulties that have beset utility companies for the past four years are at an end, pervaded the fourteenth annual convention of the Missouri Association of Public Utilities, held at Jefferson City, Mo., June 3-5, with an attendance of over 100 delegates.

Statements reflecting the belief that better times were ahead were made by L. P. Andrews, the newly elected president of the association, as well as by William G. Busby, chairman of the Public Service Commission of Missouri; M. H. Aylesworth, executive manager of the National Electric Light Association, and other speakers during the convention.

Four sessions were held during the three days of the convention, Friday and Saturday afternoon being given over to entertainment of the visitors by the citizens of Jefferson City, while the annual banquet of the association was held at the Hotel Madison on Friday night, which was the convention headquarters, though the business sessions were held in the House of Representatives room in the new state capital building.

The convention was called to order Thursday morning by L. P. Andrews, acting president, J. M. Scott of Kansas City, who was elected president in 1919 having resigned that office when he removed to Oklahoma. An address of welcome was delivered by Wallace Crossley, lieutenant-governor of Missouri.

Opportunities for Sale of Electrical Appliances Discussed.

C. E. Michel, manager of the commercial department of the Union Electric Light & Power Co., St. Louis, presented a paper on "Merchandising of Electrical Appliances." In discussing this subject Mr. Michel said in part: "A great many electrical appliances may well be considered as necessities of life as we live it today, but I do not hesitate to say that, excepting only a very few articles, the public is not aware of the fact. This is more readily brought to mind when we consider what a large proportion of appliance sales are due to intensive sales methods and what a small proportion of the whole results from over-the-counter sales.

"Electrical appliances generally do not come under that class of merchandise which puts a limit on their own consumption. By this I mean that by proper publicity and sales effort it is comparatively simple to demonstrate the advantages of using many instead of only one or two appliances in the home.

"How young and undeveloped is the business

Recent Photograph Shows Electric Lighting as Seen from Mt. Wilson

Copyright by Ferdinand Ellerman.

Evidence of the utility and extent of electric lighting is forcibly shown here. The photograph, which was taken at the instance of C. W. Koiner, general manager of the municipal lighting department of Pasadena, Cal., was taken from Mt. Wilson, which has an altitude of 6666 ft. The lights in the foreground are those of the city of Pasadena, 10 mi. distant. Beyond are the lights of Los Angeles, 20 mi. away, while those in the distance indicate the beach cities; for instance, on the extreme left is Long Beach, on the extreme right is Hollywood, and in between are Venice, Santa Monica and Ocean Park, these cities being 40 mi. from Mt. Wilson. Without electric lighting, or some substitute for it, such a photograph would be a smear of black. But the brilliance of the electric lighting, contrasted against the dark background, makes a novel photograph which has the significance of indicating the broad use of electric lighting and its importance to the public.

is forcibly brought to the mind by the multiplicity of theories on this subject vigorously set forth by their advocates, many of them as demonstrated facts allowing of no deviation and no exception. Within a year I have heard the sales manager of one of our largest central-station companies hold forth as a fact the statement that appliances are still in the first stage of development; that the central-station company should market them at a low price and bear whatever loss this entails, including the total cost of advertising. This man nearly came to blows with the manager of an equally large central-station company who stated that such a suggestion was about as sensible as would be one to supplant our modern system of transportation with the oxen and two-wheel carts of the ancients.

"What shall we sell? This is a question that is being seriously debated. In other words, are we to confine our efforts strictly to energy-consuming devices or are we also to sell related merchandise? Are we to conduct real electrical stores or are we to send our customers to some other shop for related merchandise which does not in itself consume electrical energy? It is my personal belief that with reasonable limits we should handle the related merchandise. For instance, it is my judgment that when we are selling floor lamps, rightfully considered as an energy-consuming device, we should also sell shades with which to equip them. On the other hand, I cannot concede the point that because we sell electric ranges we should sell kitchen tables, dishpans, etc."

In closing Mr. Michel said: "The world is cluttered up with would-be salesmen, untrained and undeveloped, unfit men and women who think they possess the knack of selling, learning only in the school of experience, and, on the way, bungling matters with their crude and amateurish methods. The fact is the supply of really good salesmen is distinctly limited and commercial managers must know and train their own sales forces and then hold them to a strict accounting on results achieved. I know of no more important principle of merchandising."

In the discussion that followed Mr. Michel's paper it was brought out that most of the central-station companies in the small cities held closely to the custom of selling only energy-consuming appliances, leaving the handling of the related devices to electrical or other dealers.

Says Fair Commissions Best Means to Regulate Utilities.

In speaking on "State vs. Municipal Regulation," Mr. Busby explained why, in his view, state regulation was far superior to municipal regulation, saying: "Cities and towns cannot regulate the rates and service of railroads, express companies, telegraph and long-distance telephone companies, or efficiently value the properties or supervise the issuance of securities of public utilities. Experience has shown that it is much better to combine the power of regulating all the public utilities of a state in a state commission which is in continuous session, devotes all of its time and study to the question of utility rates and service, is aided by its experts on engineering, valuation, accounting, rates and service, is removed from political and local prejudice and is therefore fair and impartial, and which conducts all its hearings for the sole purpose of securing just and adequate service for the public in return for fair and reasonable rates."

Mr. Busby spoke of attacks and criticisms that had been made on the Missouri commission for raises in rates granted utilities during the war period, and said such attacks were unjust because the result of the commission's rulings was that the utilities had been able to grant living wages to their employes, strikes had been averted and the public had continued to receive service which was essential not only to the successful prosecution of the war but to the business, comfort and convenience of the people. Had not the state commissions in Missouri and other states permitted utilities to raise their rates to meet the increased cost of operation, there would have been curtailment of service and many receiverships for utilities, with large receivership expenses and even higher rates to be paid by the public. It was much better, contended Mr. Busby, that the commissions should grant the necessary increases in rates.

M. H. Aylesworth Speaks on Public Information About Utilities.

At the commencement of his talk Mr. Aylesworth pleased his hearers by announcing that he had arranged with Mr. Busby to be one of the principal speakers at the next annual convention of the N. E. L. A. where he would present a paper on "Public Relations." Mr. Aylesworth said public utility companies themselves were largely to blame because politicians and demagogues were allowed to cry out that the "public utilities are robbing the public." The public believed it, he said, because the utility companies have not laid their hands on the table and showed where the politicians and demagogues were wrong.

"We can't expect the courts and commissions to educate the public," he declared. "We must do it ourselves, and I am glad to be able to say that utility companies of all kinds are awakening to this fact and taking up educational campaigns." Mr. Aylesworth urged the establishment of a state committee on public utility information and gave a brief outline of what had been done by such committees in other states.

"Go into the trenches and meet the men who lie about us," he urged, "and don't use the term 'light bill' in referring to the cost of illumination. Use the term 'service bill.' Light is, or should be, but a small part of the bill rendered customers. Think of the electrical appliances and think of them in 'service' terms."

Following the Friday session Mr. Aylesworth had a short caucus with the central-station representatives present at the convention and explained the N. E. L. A. geographic division plan to them, with the result that at the executive committee meeting Saturday morning it was decided to make the Missouri association a part of the Middle West geographic division, which will consist of the states of Missouri, Kansas, Iowa and Nebraska.

Other papers read at the convention were: "Merchandising of Transportation," by F. G. Buffe, Kansas City Railway & Light Co.; "How to Build Up the Revenue of Small Electric Plants

by the Manufacture of Raw-Water Ice." by George E. Wells, consulting engineer, St. Louis; "Telling the Story of Gas to American People," by Charles W. Person, American Gas Association, New York City; "Water-Power Development in Missouri," by P. G. Sargeant, Empire District Electric Co., Joplin, Mo., and "The Banks and the Public Utilities," by C. E. Randall, Bank of Commerce, Springfield, Mo.

L. P. ANDREWS ELECTED PRESIDENT OF MISSOURI ASSOCIATION.

The following officers were elected for the ensuing year: President, L. P. Andrews, manager, City Water Co., Sedalia; first vice-president, Herman Spoehrer, secretary and treasurer, Union Electric Light & Power Co., St. Louis,; second vice-president, Philip J. Kealy, manager, Kansas City Railways Co., Kansas City; third vice-president, E. R. Locke, manager, Mexico Power Co., Mexico,; secretary and treasurer, Frank D. Beardslee, sales manager, Union Electric Light & Power Co., St. Louis. The new members of the executive committee are E. D. Smith, United Railways, St. Louis; H. Wurdack, Light & Development Co., St. Louis, and J. S. Tritle, Westinghouse Electric & Manufacturing Co., St. Louis. Members of the committee on public affairs are L. B. Landsmann, Capital City Water Co., Jefferson City; B. C. Adams, St. Joseph Light, Heat & Power Co., St. Joseph; J. W. Dana, Kansas City Gas Co., Kansas City; E. D. Bell, Electric Terminal Railway, St. Louis, and J. C. Van Mauer, Laclede Gas Co., St. Louis.

Thursday evening the delegates were entertained at a barbecue and dance at McClung Park by the citizens of Jefferson City. Friday afternoon was devoted to golf at the Jefferson City Country Club, at which some wonderful scores were reported but few cards actually shown, while Saturday afternoon was occupied with a visit to the Missouri State Prison where a ball game between two teams of inmates was played for the benefit of the visitors.

At the banquet Friday night John C. Hall, a prominent St. Louis lawyer, acted as toastmaster, and created a lot of enjoyment for the guests by the clever manner in which he called on the different speakers.

CABLE LAYING IS DISCUSSED BY SEATTLE ENGINEERS.

At the May meeting of the Seattle Section of the American Institute of Electrical Engineers the principal paper taken up was one by H. J. Sheppard, district engineer of the Pacific Telephone & Telegraph Co., on "Methods Used in Laying Submarine Cables." Willis T. Batcheller, secretary of the section, was named as delegate to the annual convention of the A. I. E. E. at White Sulphur Springs, W. Va., June 29-July 2, and was instructed to bring before the convention the matter of the classification of electrical engineers. The question of admitting junior members to the organization was discussed and Mr. Batcheller was requested to also bring this matter before the convention. In the absence of Chairman C. E. Quinan, John Harshberger presided at the meeting, which was attended by 60 members.

MANUFACTURERS COUNCIL OPENS NEW OFFICES.

The Electrical Manufacturers Council has opened an office in the Fifth Avenue Guaranty building, 522 Fifth avenue, New York City. This office will serve as a headquarters for the council and its work. The council co-ordinates the work of constituent organizations of the electrical manufacturing industry and its activities have been increased with the development of those organizations and the growth of the industry. The constituent organizations which have representatives on the council are the Associated Manufacturers of Electrical Supplies, the Electrical Manufacturers Club and Electric Power Club.

COMING CONVENTIONS.

North Central Geographic Division of the National Electric Light Association. Annual Convention, Minneapolis, Minn., June 16-17. Headquarters, Radisson Hotel. Secretary, M. Barnett, Northern States Power Co., St. Paul.

Iowa Section of the National Electric Light Association. Annual Convention, Colfax, Ia., June 23-25. Assistant Secretary, Rex H. Clark, Des Moines, Ia.

American Institute of Electrical Engineers. Annual Convention. White Sulphur Springs, W. Va., June 29-July 2. Headquarters, The Greenbrier. Secretary, F. L. Hutchinson, 33 West 39th street, New York City.

Ohio Electric Light Association. Annual Convention. Cedar Point, O., July 13-16. Secretary, D. L. Gaskill, Greenville, O.

Pacific Coast Section of the National Electric Light Association, Annual Convention, Portland, Ore., July 21-23. Chairman, R. M. Boykin, Portland, Ore.

Michigan Section of the National Electric Light Association. Annual Convention, Ottawa Beach, Mich., Aug. 24-26. Headquarters, Hotel Ottawa. Secretary, Herbert Silvester, Ann Arbor, Mich.

New England Section of the National Electric Light Association. Annual Convention, Kineo, Me., Sept. 13-16. Secretary, O. A. Bursiel, 149 Tremont street, Boston, Mass.

National Association of Electrical Contractors and Dealers. Annual Convention, Baltimore, Md,. Oct. 4-8. Headquarters, Southern Hotel. Secretary, W. H. Morton, 110 West 40th street, New York City.

NATIONAL COMMITTEE WILL AID IN FUEL SHORTAGE.

The National Electric Light Association has been advised by the acting secretary of the National Committee on Gas and Electric Service that the Washington representative of the committee is in daily touch with the Interstate Commerce Commission, presenting the individual cases reported by gas and electric light and power companies of shortage in coal supply. Cases requiring attention should be reported direct to the offices of the committee, room 950, Munsey building, Washington, D. C. It must be remembered by companies requiring aid that action can only be secured where full information is given, including the amount of coal actually on hand and the rate of daily consumption, the name of the contractor or shipper, the location of the mines and the railways over which the delivery is made.

COMMERCIAL PRACTICE

New-Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

BALTIMORE CO. MAKES NOVEL USE OF NEWSPAPER.

Consolidated Gas, Electric Light & Power Co. Uses Entire Page to Advertise Service and Appliance Branches of Business.

The Consolidated Gas, Electric Light & Power Co., of Baltimore, Md., is making extensive use of the Baltimore daily newspapers in an advertising campaign that has many novel features. In frequent issues the company makes use of whole pages in explaining to the public how to "Modernize Your Housekeeping Methods," this being the guiding line over one of the recent advertisements run by the company. Other advertisements have had similar catch lines.

The page is made up in similar style to the usual news pages of the paper with reading mat-

Page in Baltimore (Md.) Newspaper Explaining to the Public How to "Modernize Your Housekeeping Methods."

ter pertaining to electrical subjects occupying the top portion of the first four columns, the rest of the page being given up to advertisements. The reading matter is written in a style to appeal to women readers and makes the page really an "electrical page" which has been found to be a big aid in the selling campaigns of the company.

In a recent page space was devoted to advertising the merits of a washing machine, a vacuum cleaner, gas range, gas water heater, electric coffee percolator, electric sewing machine and several other devices. In using this space the Consolidated company localizes its name by referring to itself only as the "Gas & Electric Co.," no mention being made of the corporate name.

DISCUSSES REVENUE FROM MAKING OF RAW-WATER ICE.

St. Louis Engineer Tells Possibilities That Are Open to Small Electric Plants Through Manufacture of By-Product.

That the manufacture of raw-water ice can be successfully and profitably conducted by small electric plants was explained by George E. Wells, a consulting engineer of St. Louis, Mo., to delegates in attendance at the recent annual convention of the Missouri Association of Public Utilities.

In his paper Mr. Wells brought out some interesting points in connection with the equipment required for ice-making in a small plant. The modern electric-driven raw-water ice plant consists of an ammonia compressor driven by electric motor, he said. For rough calculation a maximum of 3 hp. per ton of ice per 24 hours for driving the compressor can be figured. If the condensing pressure is low the power will be much less than the above, but it is probably safer to figure ample motor capacity in order to provide for any emergency in considering the fact that the motor efficiency is practically as high at any point between one-half and the full load.

The auxiliary equipment is as follows: One to two motor-driven agitators for each freezing tank, depending upon size; freezing tank of 50-ton capacity or more, probably equipped with two agitators operating in series. A 25-ton freezing tank, for example, would have an agitator driven by a 5-hp. motor. The pumps throughout the plant should be centrifugal pumps wherever it is possible to use them. Assuming that the water supply is in range of ordinary suction lift it is well to place centrifugal pumps, motor driven, at a low level, and pump water into the cooling tower. One circulating pump would take water from the cooling tower pit, pump it through the ammonia condensers and over the cooling tower, if a double-pipe condenser is used. When atmospheric condensers are used two pumping operations are generally employed. There is also an electric-driven centrifugal pump for circulating brine, an electric motor for driving an air compressor for furnishing air for agitating waters in cans, a small brine pump to circulate brine through the dehumidifier and an electric motor for operating the ice hoist.

Another problem to be carefully considered in connection with the freezing of raw water is to find out whether or not such raw water will

make good clear merchantable ice. There are some cases where raw water cannot be frozen to advantage, generally where sulphates occur in the water, and it is a very difficult matter to treat the water so that good ice can be made.

The use of synchronous motors in place of induction motors for ice-plant operation has been given a great deal of study in the past and stands to receive favorable consideration owing to the fact that the synchronous motor can be operated at a much higher power-factor than the induction motor. Selling the ice-plant power should be a profitable field for any electric central-station company.

Since the introduction of the raw-water freezing system the electric-driven raw-water plants are now the common rule and not the exception. The greater part of the electric plants which have been installed in the city of St. Louis during the past three years have utilized electric motors for prime movers and have adopted the raw-water ice-making system. This same statement applies to Chicago and, in fact, to a great many cities throughout the country. This is largely due to the fact that the investment is much less than would be the case with steam-driven units.

The combination of the electric plant and ice-making plant is also a desirable combination as the two lines of business can be worked together very successfully. In such a case of combined plant, the overhead can be easily divided between the two branches of the business as they seem to require about the same type of talent to operate either kind of a plant. The electric load is the heaviest and most profitable in the winter time, while the reverse is true with the ice-making plant.

Granting that both the electric industry and the ice industry are staple businesses capable of improvements and development by good engineering and good management, it certainly stands to reason that a combination of the two businesses must be successful particularly in the case of a small community where neither business is sufficient to tax all the efforts of one management.

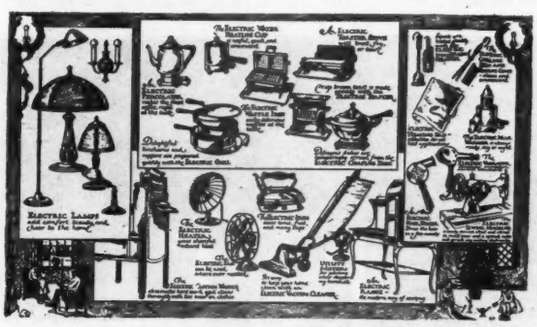
The table herewith shows the approximate amount of power required in connection with auxiliaries for the operation of a 35-ton and a 50-ton ice-making plant:

	35-ton plant	50-ton plant
Ammonia compressor	90 hp.	125 hp.
Water pumps	13 hp.	17 hp.
Air compressor	14 hp.	20 hp.
Agitators	3 hp.	4 hp.
Dehumidifiers	2 hp.	2 hp.
Hoist	2 hp.	2 hp.
Miscellaneous	1 hp.	2 hp.
Total	125 hp.	172 hp.

It has been stated in many cases that in the ice-making business the raw material is water which costs nothing; consequently everything taken in is profit. A careful study of the ice plant from an investment point of view shows that with the average plant operating its own delivery system, the cost of operation could be divided up in three portions, one-third being manufacturing expense, one-third selling expense and one-third general expense, this latter being salaries of officers, bookkeepers, clerks, insurance, taxes and depreciation. Selling expense would include upkeep of all delivery equipment, drivers' wages, etc. This information is valuable for the benefit of those who seem to think that the only possible expense around an ice plant is the fuel burned under the boiler. Knowledge of this kind should be given wherever possible to the general public so that it may have some conception of the costs which enter into manufacturing of this character and not be under the impression that such a commodity as ice can be produced at practically no cost or that all the money received from its sale is profit.

EARLY START IS GIVEN N. E. L. A. CHRISTMAS CAMPAIGN.

The publication committee of the National Electric Light Association has issued two kinds of printed matter to help central-station companies and electrical contractor-dealers make ready for a Christmas campaign for the sale of electrical appliances. One of the publications is a small booklet on "gifts that are useful all through the year," while the other is a folder than can be



Folder to Be Used in Campaign to Make 1920 Christmas an Electrical One.

easily mailed, showing a number of electrical appliances that make appropriate Christmas gifts. Both the booklet and folder are in colors and space is provided on each for the imprint of the local dealer, who distributes them. Cyril Nast, of the New York Edison Co., is chairman of the committee in charge of getting out the advertising matter. Orders for the matter or requests for information about the same should be sent to the publication division, National Electric Light Association headquarters, 29 West 39th street, New York City.

COMPANY ISSUES PAMPHLET AS AID IN PUBLICITY CAMPAIGN.

The New Orleans Railway & Light Co. has distributed a small pamphlet entitled "A Series of Newspaper Advertisements," which contains reproductions of several advertisements published by the company in New Orleans papers. The purpose of the publicity is to acquaint the New Orleans citizens with the difficulties that confront a public utility operating on a fixed income and to show that additional revenue is necessary if service is to be maintained. By presenting facts about its own conditions as well as about those under which other street railway companies operate, the New Orleans company shows the relative disadvantage under which it exists.

CONTRACTOR-DEALER

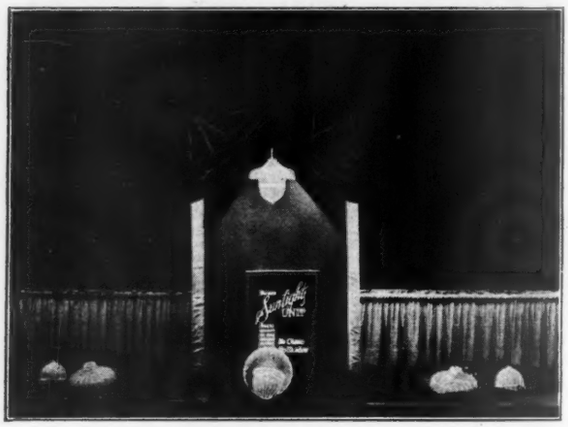
An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-keeping for the Dealer in Electrical Goods

DESIGN FOR DISPLAY OF LIGHTING UNIT IN OPEN WINDOW.

Walkerville (Ontario) Hydroelectric Commission Utilizes Simple but Effective Method for Trimming Window in Lighting Campaign.

Where a large open window space is available, a simple and effective display may be made up of lighting units arranged as in the accompanying illustration.

From the arch in the center of the display is suspended one of the units wired for illumination. The light from this unit shines down on the framed, lithographed show card furnished by the maker, and upon three unassembled units ar-



Arrangement of Simple Display of Lighting Fixture in Open Window.

ranged to emphasize the decorative features of the dome and diffusing bowl.

At the back of the window space is a heavy black curtain that excludes the light from the interior of the store and brings the display into sharp relief. Draped over the arch of the frame in the center is a piece of purple velvet, and the same material is used for the short draperies suspended from the curtain poles on either side of the frame. The posts are wrapped with white cloth. The pieces on the floor of the display are nested in rumpled folds of black velvet.

FIXTURES IN HAND-WROUGHT IRON LATEST TO ATTRACT TRADE.

Introduction of Polychrome Painting Over Iron Furnishes Handsome New Line to Inspire Use of Modern Illumination.

Electric lighting fixtures in hand-wrought iron, painted in polychrome, are making a bid for the attention of the dealer-contractor as a newer feature with which to attract the trade. The variety of design to which the iron lends itself, and particularly the introduction of colors, combine to attract and meet the varied tastes of customers. These fixtures are evidently the product of some of the best talent in designing and polychrome work.

Particularly noticeable in a display room are the floor lamps done in this new medium. The standards are tubular, as a rule, with fancy wrought bases and encircling leaf and flower designs worked out in thin metal. The colors employed constitute the chief attraction, rendering the fixtures very effective. The combinations include green and gold, ivory and blue, bronze, red and blue, and, in fact, a general application of the new tone effects noticeable in terra cotta furniture and other furnishings that reflect the general trend toward modern commercial design.

LOCAL NEWSPAPER ADVERTISING IS INDIVIDUAL PROBLEM.

Examples of Methods Used by Electrical Dealers, With Suggestions for Those Who Believe in the Benefits from Local Advertising.

Advertising in the local newspapers is a matter that carries no workable rule that will apply to all electrical dealers. It is a problem that each dealer finds it most wise to solve for himself. Local conditions have to be studied by the dealer, who is already aware that it is not the amount of space he may buy in the paper, but the character and quality of the message that brings results.

Dealers who simply run a business card in every issue say that, while they have no means of checking up the value of such advertising, still they hesitate to discontinue because it is the custom of other merchants in their community to use such space. Other dealers are accustomed to using occasional display space for special announcements of sales and campaigns, varying the message occasionally with the offer of a special bargain intended to get new customers into the store. Success of these latter vary according to locality.

One successful dealer who uses local papers says he first figures out an appropriation that his business will stand. He then selects the most popular evening paper. He does not overbuy in order to get cheaper rates and he does not distribute his appropriation throughout all the papers since it would cost him a higher rate per inch and the circulation of several papers is sure to overlap. If he is advertising appliances for the home he endeavors to select space on the page of most interest to women. He runs his advertisement on Monday or Tuesday because there are fewer ads in the paper on those days and he gets a better position.

Business Hints for the Dealer

How a Small Dealer Built on Personality and Percolated Coffee—Repair Stand in Display Window—Classifying Customer Types

The small dealer of today may easily become the large dealer of tomorrow in the field of electrical appliances. Even if compelled to start with a one-man store in a community center near the outer edge of the city, with a limited assortment of stock, a little experience and a liberal amount of self-confidence, he has a better chance to build big than in many another line of business.

With a one-man store there is every opportunity of laying the foundation of future success upon the rock of personality—personal service that will live long after he has become the head of a large corporation in the midst of the busier mercantile section. In a suburban section of any large city, and in most any small city, too, may be found the kind of dealer who is building properly today for a future of greater magnitude and wider opportunity.

In a suburb of a large eastern city there is a certain dealer who, while he may not be doing a single thing that is new and different from the practices of fellow dealers in other sections of the country, is combining certain characteristics of successful merchandising that can scarcely keep him out of the big dealer class for a very long time.

This man never permits his mind to rest from devising ways and means of making his neighborhood think of his store first when they want things electrical. His personality is pleasing and the service he renders to his customers gives him a place in their minds akin to that of the family physician or legal advisor. His ability to call his customers by name when they enter the store, and some of his methods of keeping the interest of his trade lend the air of social rather than commercial intercourse—yet it is of a highly remunerative status to the young dealer.

Percolated Coffee Attracts Trade.

Not long after he started in business the young man found one of his best means of introduction of himself and his appliances to prospective customers in the renting of table appliances for parties. He soon acquired a very substantial mailing list and one of his uses of this list was to invite the housekeepers and their friends to his store on a certain day each week. The list was divided into sections, a limited number being invited each time, so that the functions took on an air of exclusiveness. Those who came were served with percolated coffee and wafers in a handsomely arranged display room at the rear of the store.

It is needless to say that these functions soon became popular and the invitations were seldom refused. The result, of course, could not be otherwise than a subtle but sure way to familiarize the visitors with the dealer's stock and the numerous uses to which electricity can be applied in the home. Nor was his select mailing list confined to coffee confabs. About once a month the dealer would select a number of housewives with whom his acquaintance suggested that they might be interested in a certain appliance, and he would invite them to a demonstration. When the visitors arrived they would find the stage set for the demonstration in the display room, all other articles that might confuse and distract having been removed for the occasion.

Repair Stand in Window Display.

Window displays in this suburban electric store were always simply but richly dressed and effective in a way that made them seem to smile an enticing invitation to enter the store. Once inside, the customer immediately became impressed that the young dealer not only knew his business but could also be relied upon to give unbiased advice and assistance in the selection of fixtures and appliances, and the proper ways to use them. In other words, he gave them real personal service.

Occasionally the dealer would feature his repair work in the display window by placing a repair stand there and employing a neat repairman to demonstrate. This display always attracted large crowds and interested many new customers. He further increased his repair department by use of his mailing list to send neat announcements inviting customers to phone him about repairs.

This young dealer is at present employing one boy to deliver orders, collect repair jobs and assist in keeping the store clean and inviting. He also employs an extra man or two for special campaigns. He has built up an excellent trade on his personality and it is not to be doubted that when he sees fit to expand by entering the general trade down town, he will have most of his old customers as the nucleus of his new field.

Appealing to Different Types of Customers.

Customers are literally "men of many minds." For purposes of analyzing their mental characteristics in the making of purchases they may be divided into three general classifications. These may be designated as the "head type," the "heart type" and the "body" or "temperamental type." The alert salesman is quick to recognize each type by the early expressions of the customer in answer to the first efforts to interest him in an appliance.

The "head type" is the man who, while examining an article to which the salesman has called his attention, clearly discloses his mental tendencies—his reasoning personality—in such observations as: "I do not see how I can use it." "I know it is a pretty good thing, but I cannot understand why you should ask that price for it." "I have no doubt it will do what you say it will, but I think it is too expensive." The distinguishing note throughout this man's expressions stands out in his emphasis of the terms "I see," "I know," "I think" and "I understand."

In handling this type of customer the salesman

emphasizes the value of the goods, laying special stress on the durability, the guarantee and the quality of material. Those are the points which have been most successful in meeting his arguments. The analytical mind reasons from cause to effect and back again in logical fashion. He must be appealed to in terms he best understands.

Then, in the case of the "heart type," the one whose feelings govern very largely everything he does; he also unconsciously refers in speech to the nature of his own mental powers and dominant influences. His argument finds expression in such phrases as "I don't believe," "It seems to me," and "I feel that——."

This type is very frequently won by bringing out points of beauty of the article the dealer wishes to sell him, pointing out the way it will harmonize with what he already has or is getting. Such people usually have hobbies—something they love better than themselves—or mere financial interest. They may be won by showing heartfelt interest in the things that appear to deeply concern them. They are of the sympathetic type and can be appealed to through the medium of sympathetic expression.

Handling the Difficult Type.

The handling of the "body type"—he of the vital temperament—requires much more diplomacy, and of a different kind than that necessary to sell the other types. This type is frequently inclined to be disagreeable to the salesman. To this type belong most of those customers termed "grouches," who strike terror to the heart of the timid and inexperienced salesman. Often the effort of the salesman to interest him is met with the bluff assertion that he does not wish to talk to you, that he wouldn't buy from your concern.

Since he intends to be shocking in his rebuff, some salesmen have found it good policy to give him a surprise or shock in return. Sometimes the shrewd salesman will begin by agreeing with him in a judicious manner, finally leading the man to turn a complete mental somersault, and obtaining his order after having agreed with him at the beginning that he "wouldn't buy anything in that line."

Other salesmen have been very successful in handling certain persons of this type by meeting bluff with bluff. When the man talked loud and pounded the counter the salesman just opened his mouth a little wider, talked a little louder and pounded the counter a little harder. Surprise was followed by awe and finally respect and the securing of the order.

DIFFERENCE IN MEANING OF DIFFRACTION AND DIFFUSION.

By J. D. Ballard.

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These two words have different and distinct meanings. Diffraction means breaking in pieces. In illumination it means the spreading of light or the deflection of its rays. It is the effect produced by the transmission of light through, or the reflection of light from, a system of fine opaque or translucent particles regularly distributed at small distances.

Fig. 1 illustrates the diffraction of a ray of light which is transmitted through a medium such as etched sand-blasted or frosted glass. The ray of light L passes through the medium and is dispersed or broken up into a number of

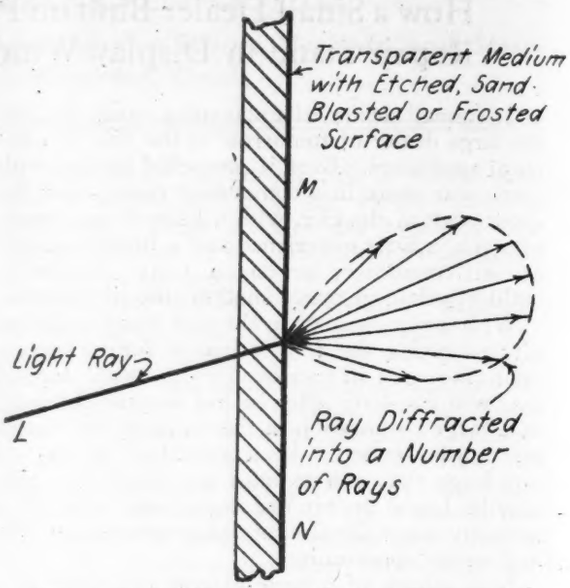


Fig. 1—Illustrating the Principle of Diffraction.

rays, as shown. However, the direction of the center of the rays will be the same as the direction of the ray L regardless of the angle which L makes with the piece of glass. Thus, when a light source is placed inside and at the center of a glass ball which is etched or roughened inside, the source appears as a brightly illuminated ball surrounded by less brilliantly lighted zones.

Diffusion means a dispersion or scattering. The diffusion of a ray of light is illustrated in Fig. 2. Diffusion of transmitted light occurs when the light passes through opalescent glass. In Fig. 2 the ray of light L passes through the opalescent glass M N and in passing through decreases materially in intensity. However, its direction, L S, remains unchanged. But at the point where the ray L emerges from the glass, the glass surface becomes a secondary light source. It then emits diffused light, as shown in the diagram. Where opalescent glass is very

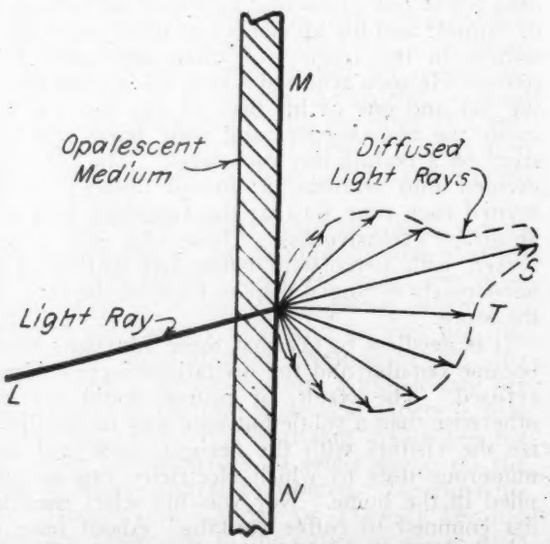


Fig. 2—Illustrating the Principle of Diffusion.

dense, the ray *S* will be of such small intensity that the light diffused in the direction *S* will not be as great as that diffused in the direction *T*. When a light source such as an incandescent lamp is located within an opalescent glass bowl the entire bowl appears to be a light source radiating light almost uniformly. That is, the entire surface of the bowl appears at about the same brightness. If the opalescent glass is heavy, the lamp filament will not be visible, but where the glass is light the filament may be more or less visible.

BOOK REVIEWS

"Principles of Direct-Current Machines." (Second edition.) By Alexander S. Langsdorf. New York: McGraw-Hill Book Co., Inc. Cloth, 460 pp. (8½ ins. by 5½ ins.) with 314 illustrations. Supplied by Electrical Review Publishing Co., Inc., for $4.

Intended for use as a text by students in electrical engineering, this book gives a reasonably complete treatment of the fundamental principles that underly the design and operation of d-c. machinery. The methods of the calculus are freely used in conjunction with an analysis in each case of the physical meaning of the mathematics. Numerous problems suitable to the subject matter are included at the end of the various chapters. This edition includes such revisions of and additions to the original text as were found suitable after four years of use by the author and others.

The first 64 pages are devoted to the general laws and definitions useful as a basis for a study of the later subject matter. All types of d-c. machines are described and illustrated, and an entire chapter is devoted to armature windings. Magnetization curves and armature reactions are each treated in separate chapters. The operating characteristics of generators are gone into quite fully and many diagrams are given to illustrate the text. Motors and motor control and operation are treated in much the same manner as generators are treated. Commutation, compensation of armature reaction, efficiency, rating and heating are all given special treatment. A special chapter is given to the problems of booster and balancer construction and operation.

"Electric Power Transmission." (Second edition.) By Alfred Still. New York: McGraw-Hill Book Co., Inc. Cloth, 407 pp. (9 ins. by 6 ins.) with 136 illustrations and numerous tables. Supplied by Electrical Review Publishing Co., Inc., for $4.

The fundamental principles and scientific laws which determine the design of overhead transmission lines are covered by this book in such a manner as to be suitable to the uses of both the practical engineer and the college student. A special chapter deals with the problems of transmission by underground cables. Trigonometrical formulas and vector diagrams have been freely employed, but higher mathematics has not been used. Only long-distance transmission problems are treated and no consideration is given to distribution systems of any description.

Elementary electrical principles and theory and economic principles and calculations are carefully treated and illustrated with drawings, tabulations and specific problems. Line calculations for type and size of conductor, regulation, power-factor and other related subjects are covered in a special chapter. Line insulation and protection against lightning are treated from various angles. Numerous drawings of insulators are presented showing in detail the shape and dimensions of the different types and sizes.

Transmission-line supports and mechanical principles and calculations are covered by two well-illustrated chapters. Line stresses due to weight, position, wind, ice and other factors are carefully treated and curves are included to simplify the application of the principles given.

"Electrician's Handy Book." By T. O'Connor Sloane. New York: Norman W. Henley Publishing Co. Cloth, 823 pages (4½ by 6¼). Illustrated. Supplied by Electrical Review Publishing Co., Inc., for $4.

A revised and enlarged edition of this book has just come from the printers and covers the electrical field in a manner that makes the book a valuable one for study and reference. It is written in terms that can be understood by the student, the practical worker and others with need of information on electrical subjects, while there is plenty in the book that will also be of interest to the advanced electrical engineer.

The book is a work of modern electrical practice, written in a clear, comprehensive manner, beginning with the first stages of electrical knowledge and going on to the advanced stages of the science. The book contains 46 chapters and wherever the text can be made more clear by means of an illustration one is inserted. There are 600 specially made engravings in the book.

"Notes on Magnetism." By C. G. Lamb, M. A. London, England: Cambridge University Press. Paper, 94 pp. (8½ ins. by 5½ ins.), with numerous illustrations. Supplied by Electrical Review Publishing Co., Inc., for $1.50.

This book covers such portions of the magnetic theory as are required to be understood in the reading of technical textbooks. Beginning with a description of a magnet and a magnetic field the text goes into the subjects of galvanometers, induction, hysteresis, eddy currents, refraction of flux, leakage, etc. Methods of testing are described and illustrated. Special cases such as the earth's field and the e.m.f. of the dynamo are treated separately.

"Ions, Electrons and Ionizing Radiations." By James Arnold Crowther, Sc.D. New York: Longmans, Green & Co. Cloth, 276 pp. (8½ ins. by 5½ ins.), with 94 illustrations and 11 tables. Supplied by Electrical Review Publishing Co., Inc., for $4.

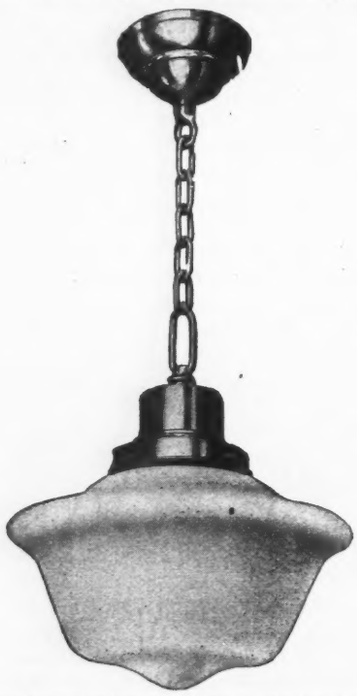
This book is intended for the use of students already grounded in the elementary principles of physics. Mathematical treatment is simplified so that the book may be used by persons of limited mathematical experience. A study of the gaseous ion, together with an analysis of the passage of current through normal and ionized gas, serves to open the way for the following subject matter: The charge on an ion, ionization by collision, discharge tubes, cathode and positive rays, emission of electricity by hot bodies, photo-electricity, radio-active changes, radium and the electron theory of matter.

NEW APPLIANCES

Newly Developed and Improved Electrical and Mechanical Apparatus, Appliances, and Devices Now Being Placed on the Market

Commercial Lighting Unit of Dust-Proof Design.

The Ivanhoe "Trojan" commercial lighting unit is of a new inclosed design for type C lamps of from 75 to 500 watts capacity. It is a one-piece



Ivanhoe "Trojan" Inclosed Lighting Unit for Commercial Service.

unit made in 12, 14 and 16-in. diameter by the Ivanhoe-Regent Works of General Electric Co., Cleveland, O. The glassware used with this unit is of light density, low absorption and of high diffusing quality, and is so shaped as to give a good distribution curve.

The position of the lense in this unit, the high diffusing quality of the glass, as well as the dimensions and contour of the unit gives freedom from glare and objectionable brightness when used with the sizes of lamps for which it is designed. Because of the large radiating surface provided no special ventilation is required and, having no exposed inside surface, the unit is practically dirt proof.

Distributing diffused light both above and below the mounting plane, this unit produces a pleasing luminous effect in all directions without sharp shadows or lines of contrast. The manufacturer recommends it especially for the illumination of stores, offices, assembly halls, hotels, cafeterias, churches, display rooms, pool rooms, banks and other locations where an opal inclosing unit of pleasing lines is desired.

Series-Wound D-C. Motor for Crane and Hoist Service.

For severe intermittent varying-speed service where heavy starting torque is required, such as for cranes and hoists, the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has recently brought out the type HK, d-c, series-wound motors. These motors are especially designed for use where the load consists of a series of starts, stops and reversals, the motors being idle for only short periods of time.

These motors are of inclosed construction with small openings in the lower part of the frame for ventilation. Covered openings in the top half of the frame give access to the brushes and the commutator. The most prominent feature of this motor is its compact construction, giving small overall dimensions, light weight and great mechanical strength.

The motor has a forged steel frame and solid forged steel feet. Motors above 3-hp. rating are equipped with commutating poles so that high momentary loads can be carried without serious sparking, and long life of commutator and brushes is thereby insured. All field coils are thoroughly insulated and impregnated. The end brackets carry oil wells, bearing housings and brush-holder mountings. The brackets are fixed and, hence, the brush position is the same for both directions of rotation.

Armature coils are form wound and insulated and impregnated before being placed in the slots. A blower is placed in the rotor, effectively ventilating both armature and field windings. This allows a smaller diameter armature to be used, resulting in low flywheel effect, a minimum of energy required to start and

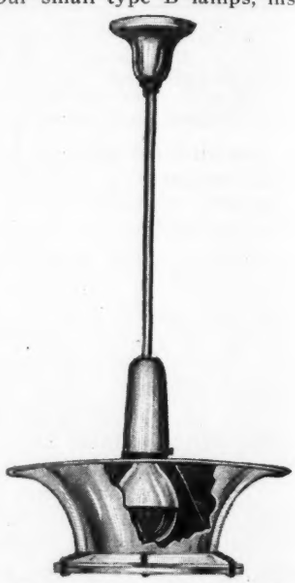
Series-Wound Motor for Variable Speed High-Torque Service.

stop the motor, and a minimum of wear and tear on bearings and brakes.

Electrically operated shoe-type brakes are supplied when ordered, and are bolted to machined lugs on the motor bracket, thus making a compact unit of motor and brake.

Shadow Shield for Use With One-Lamp Fixtures.

An old style of lighting unit which has been widely used in homes, stores, offices and other places consists of an inverted glass bowl suspended from the ceiling by chains. In this bowl it has been the practice to use three or four small type B lamps, inserted



Device for Eliminating Shadows Cast by Suspended Fixtures.

at an angle. This type of fixture was adequate to the requirements or demands of the time and was a great improvement over older types of equipment, but the development of the larger and more efficient type C lamps opened up a new era in illumination.

Many dealers are now adopting the one-lamp method of lighting instead of the earlier multiple-lamp method. The former involves the use of a single type C lamp of suitable size hung in a vertical position in the center of the glass bowl. Less wire, fewer sockets and generally simpler construction results from the adoption of the one-lamp fixture.

However, when the ordinary type C lamp is used, shadows of the upper edge of the bowl as well as shadows of the chains are cast on the ceiling, thus marring its appearance. To overcome this defect, a new device known as the "Shadow Shield" has been placed on the market by the Western Electric Co., New York City. It is made of a white, translucent glass and fits down on the neck and upper part of the bowl of the type C lamp. It so thoroughly diffuses the light cast upward that no shadows appear on the ceiling.

"Shadow Shields" are supplied for 100, 150 and 200-watt lamps.

LATEST APPROVED APPLIANCES

Approved by Underwriters' Laboratories, Following Examination and Tests Conducted Under the Standards of the National Electrical Code

Armored Cable.—Federal Armored Cable Co., 609 West 48th street, New York City.

Marking: One brown cord parallel to conductors between conductors and armor, or letter "F" stamped at intervals of about 6 ins. along outer surface of armor.

Listed March 18, 1920.

Armored Cable.—Standard Flexible Conduit Corp., 158 Eleventh street, New York City.

Marking: Letter "S" stamped in armor at intervals of about 3 ins.

Listed March 17, 1920.

Conduit Boxes.—Thomas & Betts Co., 63 Vesey street, New York City.

"T. & B. Dead Ground" cast-iron conduit boxes for use with flexible steel conduit or armored cable; catalog Nos. 565 and 566 clamp type.

Listed April 1, 1920.

Fixtures, Vapor-proof.—Frank W. Morse, 293 Congress street, Boston, Mass.

"Morse" vapor-proof fixtures; catalog No. 12.

Listed March 26, 1920.

Flatirons.—Simplex Electric Heating Co., Cambridge, Mass.

"Simplex"; 250 volts or less, 200-750 watts, type Nos. 1906-07, 1909, and 1915; tailor's irons, 600-825 watts, type Nos. 1845, 1847, 1859, 1918, 1920 and 1922.

Listed March 10, 1920.

Fuses, Renewable Cartridge. — Multiple Electric Products Co., 61 Broadway, New York City.

"Atlas" four-in-one fuses of cartridge form: 0-100 amperes, 600 volts.

Listed April 23, 1920.

Heaters, Air.—Edison Electric Appliance Co., Inc., 5660 West Taylor street, Chicago.

"Edison Glow" luminous air heaters; 600 watts, 95-250 volts; catalog No. 216 A10.

Listed March 15, 1920.

Heaters, Air. — Simplex Electric Heating Co., Cambridge, Mass.

"Simplex" non-luminous air heaters; type Nos. 125, 143-44; 2000-8000 watts, 250 volts.

Listed March 10, 1920.

Heaters, Air.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Westinghouse "Cosy Glow" radiator; 240 volts or less; style Nos. 278758 and 278759.

Listed April 2, 1920.

Heaters, Bath Cabinets.—Burdick Cabinet Co., Milton, Wis.

Metal cabinet designed for medical heat and light bath treatment of persons; types A and B.

Listed March 23, 1920.

Heating Appliances, Cooking and Liquid. — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Westinghouse"; disc stoves, 600 watts, 100-250 volts; styles 189197-205 and 20701-02; toaster, Model B. 550 watts, 100-120 or 200-240 volts; styles 266963 and 266965; table stove, 660 watts, 100-120 volts, styles 289112-3; percolators, 320 watts, 32 volts, styles 284057-8; 380 watts, 100-125 volts, styles 251401-03, 262739-41 and 280735-7.

Listed April 2, 1920.

Heating Appliances, Industrial and Laboratory.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Westinghouse" dry-type glue pots; style Nos. 252668, 256814, 256817, 289829-32, 240 volts or less 80-140 watts; rectangular stove; style Nos. 140606, 140609, 110 volts, 350 or 450 watts.

Listed April 2, 1920.

Insulating, Sealing Compounds.—E. T. Trotter & Co., 588-94 Johnson avenue, Brooklyn, N. Y.

"B. P. C. No. 20" and "Red Seal No. 16" sealing compounds.

Listed March 3, 1920.

Insulating, Wire Splice Devices.—The Elasticap Co., 702 Clinton street, Hoboken, N. J.

"Elasticaps." Vulcanized rubber caps for use with No. 14 to No. 18 B. & S. gage wires, catalog No. 214; for use with No. 10 to No. 14 B. & S. gage wires, catalog Nos. 210 and 210-Marine.

Listed March 20, 1920.

Receptacle for Attachment Plugs and Plugs.—The Bryant Electric Co., Bridgeport, Conn.

Combination for use on ranges, consisting of porcelain base provided with receptacles for two plug-type fuses and attachment plug cap; 10 amperes, 125 volts; catalog No. 136.

Listed April 2, 1920.

Receptacle for Attachment Plugs and Plugs.—Universal Electric Stage Lighting Co., 240 West 50th street, New York City.

"Kliegl" fiber two-wire receptacles and pin plugs for use only for portable stage appliances; 5-100 amperes, 125 volts; catalog Nos. 955-59.

Listed March 22, 1920.

Receptacles, Medium Base. — The Bryant Electric Co., Bridgeport, Con.

"Bryant" and "Perkins" metal-shell, medium-base receptacles; key, catalog Nos. AW-40 to AZ-40, AW-41 to AZ-41, BA-40 to BH-40, BK-40 to BN-40, BP-40, BW-40 to BY-40, BA-41 to BH-41, BK-41 to BN-41, BP-41 and B-W-41 to BY-41; 660 watts 250 volts, catalog Nos. AW-42 to AZ-42, BA-42 to BH-42, BK-42 to BN-42, BP-42 and BW-42 to BY-42, Pull, catalog Nos. AW-45 to AZ-45, BA-45 to BH-45, BK-45 to BN-45, BP-45 and BW-45 to BY-45, also above types with lamp attachment.

Listed March 5, 1920.

Receptacles, Medium Base. — The Bryant Electric Co., Bridgeport, Conn.

Keyless, catalog Nos. 4030, 4055, 4100-03; covers 4031-32, 4219-20, 4222, 9185, 50717, 50755, 60019-20, 88258, AW-13 to AZ-13, AW-43 to AZ-43, BA-13 to BH-13, BK-13 to BN-13, BP-13, BW-13 to BX-13, BA-43 to BH-43, BK-43 to BN-43, BP-43 and BW-43 to BY-43. Cleat rosette receptacles for link fuses for use only in large mills in accordance with Rule 23-d of the National Electrical code; 2 amperes, 125 volts; catalog Nos. BS-13, 24994 and 50733. New wrinkle base; catalog No. BZ; mounting rings, catalog Nos. 304-05. Also connection block for 2-way bases, catalog No. 405; also above types with shade-holders attached; keyless type with lamp grip; also above with lamp attachment.

Listed March 6, 1920.

Switches and Fuses, Combination Snap.—The Bryant Electric Co., Bridgeport, Conn.

"Bryant" and "Perkins" double-pole, series-multiple snap switches combined with plug-type fuse bases, for use only on electric ranges; 20 amperes, 125 volts; catalog Nos. 2798, 2802, switch on 2806 base, 283392.

Listed April 23, 1920.

Switches, Inclosed.—General Electric Co., Schenectady, N. Y.

Type CR-1036 inclosed switches; 20 amperes; 3 hp., 110, 220, 440 and 550 volts. Type CR-1038; 30 amperes; 3 hp., 110 volts; 5 hp., 250 volts, and 5 hp., 220, 440 and 550 volts.

Listed April 2, 1920.

Switches, Inclosed.—General Electric Co., Schenectady, N. Y.

"G. E." 2 and 3-pole knife switches and cutout bases for standard cartridge-inclosed fuses. Inclosed in metal cases and designed for manual operation without opening cases. Type LM-4; 30, 60 and 100 amperes; 250 and 600 volts; catalog Nos. 194-802-10, inclusive, and 200157-65, inclusive.

Listed April 27, 1920.

Switches, Push Flush.—Francis Keil & Son, 401 East 163rd street, New York City.

Two-circuit push flush switches; catalog No. 32520.

Listed March 29, 1920.

ACTIVITIES IN THE TRADE

Business Developments, Sales Agencies, Trade Literature and Miscellaneous Items Concerning Electrical Manufacturers and Allied Business Interests

Franklin Electric Co., Hartford, Conn., manufacturer of electrical materials, has filed notice of the dissolution of the company.

Hanson-Van Winkle Co., 324 Chestnut street, Newark, N. J., manufacturer of dynamos, motors, etc., has completed plans for alterations and improvements in its plant at an estimated cost of about $14,500 to enable the company to increase production.

Auto Electric Shop, Newark, N. J., has filed notice of organization to operate at 1041 Clinton avenue, Irvington district, for the production of storage batteries, etc. J. E. Eppel, 170 Laurel avenue, Irvington, N. J., heads the company.

Ilg Electric Ventilating Co., Whiting and Wells streets, Chicago, has issued a folder, entitled, "Fresh Air Is the Life Force of Man Power," in which the advantages of having proper ventilation in shops and factories are explained.

Electric Controller & Manufacturing Co., 2700 East 79th street, Cleveland, O., owing to the steady increase in its business, has found it necessary to open a branch office in Boston, Mass. The Boston office is located at 49 Federal street and is in charge of M. D. Goodman.

Delta-Star Electric Co., 2433 Fulton street, Chicago, is distributing bulletin No. 303 describing its 100-ampere, 600-volt, three-phase plugs and receptacles for extra heavy duty. This equipment is included in the list of electrical appliances issued by the Underwriters' Laboratories.

Americolite Co., 101 Park avenue, New York City, manufacturer of lighting fixtures, lamp reflectors, and kindred equipment, has completed negotiations for the acquirement of the plant of the Standard Steel Box Co., Bridgeville, near Pittsburgh, Pa., for a consideration of $35,000.

J. G. White Engineering Corp., 43 Exchange place, New York City, is distributing a folder, "Industrial Buildings at Matagorda," which gives information about, and illustrations of the power plant, warehouse, machine shop and model homes erected for the housing of workmen at the sulphur plant of the Texas Gulf Sulphur Co., Matagorda, Tex.

Benjamin Electric Manufacturing Co., 806 West Washington boulevard, Chicago, is sending the trade a large folder with illustrations showing methods of dressing window displays with Benjamin "Two-Way" plugs and making the displays attractive. The folder also tells dealers what the Benjamin company will do for them in the way of free material to aid them in making proper showings of the company's goods in show-case and window displays.

Westchester Electric Supply Co., 106 Main street, White Plains, N. Y., has opened a new electric shop and will carry a full line of electrical supplies and appliances. Irving W. Austin and Walter W. Whiffen make up the membership of the company.

Edward J. Cheney has opened an office at 61 Broadway, New York City, for a general engineering and consulting practice. He will give particular attention to public utility problems, including rates, appraisals, public relations, design, construction, operation and management. Mr. Cheney has for several years been connected with the Public Service Commission, Second District, New York, and resigned the position of chief of its division of

Edward J. Cheney.

light, heat and power in order to take up consulting work. Mr. Cheney is a graduate of the University of Minnesota. After graduation he was employed by the General Electric Co., Schenectady, N. Y., where he was successively connected with the testing, a-c. engineering, and the power and mining engineering departments. For some years he has been a member of the standards committee of the A. I. E. E. and for the last two years he has been secretary of that committee.

Meadows Manufacturing Co., Bloomington, Ill., has had a motion picture taken as an advertising aid in its washing machine selling campaign. The motion picture story deals with the Monday washday in a home not equipped with an electrically operated washing machine and then shows the difference in the same home when it is supplied with the machine. The story and photography, both of which are said to be excellent, are the work of the Venard Photographic Co., Peoria, Ill.

Connecticut Electric Manufacturing Co., Bridgeport, Conn., manufacturer of electrical porcelain specialties, has recently acquired the former plant of the Standard China Works, Prospect and Globe streets, Trenton, N. J. Extensive remodeling and alterations have been made in the works and modern equipment has been installed. The works will be used for the production of electrical porcelain for insulation use.

Mermaid Dish Washer Co., Hartford, Conn., has been organized to take over the property and business of the Wolcott Manufacturing Co., Hartford, Conn., manufacturer of dish washing machines for household service. The capital stock of the new company is $150,000. The officers are Frank E. Wolcott, president and general manager; S. C. Stivers, vice-president, secretary and treasurer; E. M. Bromley, assistant treasurer. The directors are Frank E. Wolcott, Frank R. Ford, of Ford, Bacon & Davis, engineers, New York City: Walter H. Lippincott, of Bioren & Co., bankers, Philadelphia; Van Horn Ely, president of the American Railways Co., Philadelphia, and S. C. Stivers.

Harvey Hubbell, Inc., Bridgeport, Conn., is sending direct to householders an illustrated booklet bearing the title, "For Milady's Convenience," in which the advantages of having flush receptacles and current outlets at many locations in the home are pointed out. The booklet is unique in that it makes its appeal direct to the ultimate consumer rather than to the dealer in electrical appliances, and urges the person receiving the booklet to consider the question of outlets and receptacles at the time they are planning their homes rather than after they are built, thus doing an educational work in a line that has long been advocated by manufacturers of electrical appliances.

American Ever Ready Works of National Carbon Co., Inc., Long Island City, N. Y., now have posters advertising the $10,000 prize contest of the "Eveready Daylo" lamps on view in over 50,000 electric shop windows throughout the United States. The focal point of the display is the picture without a title, which contestants must see before entering their answers telling in 12 words, or less, the best uses that "Eveready Daylo" lamps can be put. In the foreground and at either side of the window are pictorial colored cutouts holding the most popular types of the "Eveready Daylo," a generous display of batteries and lights, and a clever visualization of the amount of the cash prizes in greenbacks. Dealers report a heavy demand for entry blanks, although the contest only opened on June 1. The contest closes July 31, 1920.

PERSONAL MENTION

Biographical Sketches and Chronicle of Changes in Business Connections, Promotions and Other Personal News of the Industry

J. A. HURLEY has been appointed local manager of the Newark, N. J., offices of the New York Telephone Co.

C. D. GILPIN has been appointed works manager of the Detroit (Mich.) plants of the Aluminum Manufacturers, Inc.

J. L. RAY, formerly manager of the Western Electric Co., Pittsburgh, Pa., has been transferred to New York City as power apparatus sales manager.

E. F. PARKS, general superintendent of the Universal Winding Co., Providence, R. I., is making a two months' trip in European countries.

B. M. GARDNER has been made general manager of the Cleveland Brass & Copper Mills, Inc., Cleveland, O., succeeding B. F. Brusstar, who recently resigned.

CLYDE E. DICKEY, president of the Dickey Steel Co., Inc., New York City, has been elected first vice president and general manager of the Hammond Steel Co., Inc., Syracuse, N. Y.

W. C. ALLEN, of the Public Utilities Commission of Washington, D. C., was the delegate of the Illuminating Engineering Society to the organizing convention held in Washington, June 3 and 4.

H. M. WIBLE has been appointed manager of the rectifier section, supply department, of the Westinghouse Electric & Manufacturing Co., Newark, N. J. Mr. Wible has been with this company since 1906 and has been engaged along supply lines for the last 11 years.

C. E. FAHRNER, general manager of the Ottumwa (Ia.) Railway & Light Co., has been re-elected a member of the board of directors of the Iowa Street Railway Association, and was also elected secretary and treasurer of the organization.

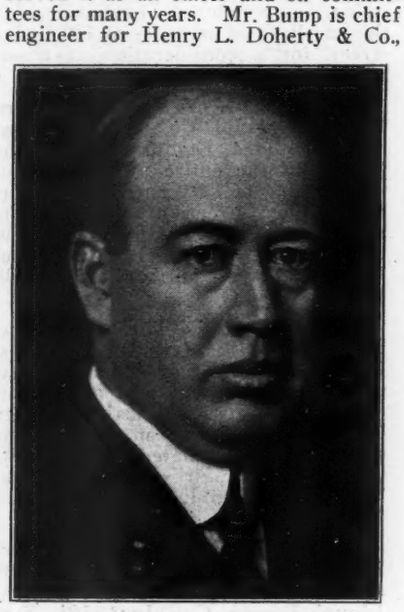
CHARLES F. SCOTT, professor of electrical engineering at the Sheffield Scientific School, New Haven, Conn., has sailed for Europe and will spend the summer in Italy where he will study certain important engineering problems for the Western Electric Co.

E. O. SESSIONS has resigned as president of the General Devices & Fittings Co., selling all his holdings in the company in order to devote his entire attention to the Sessions Engineering Co., Chicago. This change was made necessary owing to the continuous growth of the latter organization.

WILLIAM H. HENDERSON, who during the latter part of the world war was production engineer for the Wright-Martin Co., at its Long Island City, N. Y., and New Brunswick, N. S., plants and who after the war was connected with the International Time Recording Co., Endicott, N. Y., is now in the suggestion department at the West Lynn (Mass.) plant of the General Electric Co.

C. O. CULVER, Salisbury, Md., has been appointed general superintendent of the Eastern Shore Gas & Electric Co., to succeed F. W. Woodcock, recently transferred to the Philadelphia, Pa., offices of the company.

M. R. BUMP, elected first vice-president of the National Electric Light Association at the recent Pasadena, Cal., convention, has long been prominent in the work of the association and has served it as an officer and on committees for many years. Mr. Bump is chief engineer for Henry L. Doherty & Co.,



M. R. Bump.

60 Wall street, New York City, and in that position has charge of the new work and construction interests of the Doherty companies in all parts of the country. He has been a member of the American Institute of Electrical Engineers since 1903. Mr. Bump's home is in Upper Montclair, N. J.

B. W. STEMMERICH, formerly manager of the equipment section, railway department of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has been placed in charge of the safety car division of the St. Louis (Mo.) office of the company. Mr. Stemmerich has been in the employ of the Westinghouse company for 28 years and is well known in the railway field.

CHARLES A. VOLZ has been appointed chief of the heat and power division of the New York State Public Service Commission, Second District. Mr. Volz is a graduate of Cornell University, and has had wide experience with public utility properties. During the world war he served as a first lieutenant with the 302nd engineers, 77th division, and later as a captain in the engineer officers' training school, Camp Humphreys, Va.

J. M. H. MORGAN, manager of the Staunton, Va., branch of the Chesapeake & Potomac Telephone Co., has been appointed manager at Newport News and Hampton, the appointment becoming effective June 1.

H. A. BAXTER has been appointed metallurgical engineer of the Penn Seaboard Steel Corp., Philadelphia, Pa. He formerly held the same position with the Tacony Steel Co., Philadelphia.

F. A. DARST has resigned his position as superintendent of the Beloit (Kan.) light and water department and has accepted a position with the Williamson Power Co., Clay Center, Kan., where he will be in full charge of that company's development work in its territory.

I. A. COTTINGHAM, for 28 years chief engineer of the Southern Pacific Railroad, in Texas, has resigned to become chief engineer of and assistant general manager of the Houston, Richmond & San Antonio Traction Co., which is building 225 mi. of line in Texas.

D. M. PETTY, electrical superintendent of the Bethlehem Steel Co., South Bethlehem, Pa., delivered a paper on "Some Advantages of Interconnections Between Industrial Power Systems," at a meeting of the Pittsburgh Section of the American Institute of Electrical Engineers, June 8.

B. H. PECK, general manager of the Southern Illinois Light & Power Co., was the principal speaker at the June meeting of the St. Louis (Mo.) Section of the American Institute of Electrical Engineers held at St. Louis, June 7. Mr. Peck's subject was "Broader Applications of Engineering Methods."

WILLIAM R. MARSHALL has been appointed manager of the industrial division, New York City office of the Westinghouse Electric & Manufacturing Co., to succeed Harlan A. Pratt, who has resigned to become sales manager of the Atlantic Elevator Co., New York City. Mr. Marshall graduated from the North Carolina Agriculture and Mechanical College in 1909, and entered the graduate students' course at the East Pittsburgh works of the Westinghouse company. Here he remained for two years, studying shop and erection problems. In 1911 he was transferred to the New York City office as salesman in the power division to handle sales of power equipment to the paper industry.

OBITUARY.

EDMUND G. SPILSBURY, mining and metallurgical engineer, and a former president of both the Engineers' Club of New York City and the American Institute of Mining & Metallurgical Engineers, died suddenly in New York, May 28. He was 75 years of age.

BUSINESS OPPORTUNITIES

News of Electrical Construction Projects in All Parts of the Country, Proposals Invited, Foreign Trade Openings and New Companies

EASTERN STATES.

Rutland, Vt.—The Rutland Railway, Light & Power Co. has arranged for the erection of a hydroelectric plant, estimated to cost close to $500,000. The Northern Engineering Corp., 27 School street, Boston, is the contractor. The company is operated by W. Barstow & Co., New York city.

Fall River, Mass.—The Conanicut Mills has awarded a contract to the J. Crowe Co., Inc., 486 Second street, Fall River, for the erection of a one-story transformer building at their plant on Bay street.

Fitchburg, Mass. — The Fitchburg Gas & Electric Co. has had plans prepared for the construction of a one-story power plant of brick and reinforced concrete type. The Charles H. Tenney Co., 201 Devonshire street, Boston, is engineer in charge of the project.

Hartford, Conn.—Spencer Turbine Co., 484 New Park avenue, manufacturer of blowers, exhausters, and kindred equipment, has awarded a contract to the Ellison Construction Co., 100 Wellington street, Hartford, for the erection of an addition to its plant located in the West Hartford district, for increased operations. The proposed structure will be one-story, about 60 by 120 ft., and is estimated to cost about $18,000.

Waterbury, Conn.—The Connecticut Light & Power Co. has taken out a building permit for the construction of an addition to its plant at 111 West Main street. The structure will be two-story and basement, about 25 by 85 ft.

New York, N. Y. — New York Telephone Co., 15 Dey street, has awarded contract for additions and alterations in various of its telephone buildings, this work including the following: contract let to the Tidewater Building Co., 16 East 33rd street, for the erection of an addition, as well as alterations and improvements in the existing building at 61 Irving place, to cost $80,000; alterations and improvements to cost about $25,000 will be made in the structure at 51 Franklin street, Valentine Lynch, 15 Park Row, being the contractor: contract awarded to D. C. Weeks, 1123 Broadway, for the construction of an addition to the exchange building at 178th street and Webster avenue, to cost $66,000. The company has also completed negotiations for the leasing of the entire fifth and sixth floors of the building at 139 Centre street, at an aggregate rental of about $400,000, to be used for office purposes.

New York, N. Y.—The Interborough Rapid Transit Co. has made application to the Public Service Commission, Albany, for permission to place into effect increased rates of fare for its traction system.

New York, N. Y.—Operations have been inaugurated on an additional section of the east side rapid transit system, extending 2¼ mi. from Hunt's Point avenue to 175th street. It is expected that work on the remaining section, from 175th street to Pelham Bay Park will be completed by fall. The cost of the entire extension is estimated at $5,287,000.

New York, N. Y.—The New York Edison Co., Irving place and 15th street, has concluded negotiations for the purchase of property at 120 Cedar street, for a consideration of about $60,000.

New York, N. Y. — The Western Union Telegraph Co., 195 Broadway, has completed negotiations for the leasing of the entire fourth floor of the building at 139 Centre street, corner Walker street, at an aggregate rental of $225,000. It is proposed to utilize the space, which totals about 11,000 sq. ft., for additional office facilities.

New York, N. Y.—The United Electric Light & Power Co., 130 East 15th street, has completed arrangements for the erection of a transformer station at 204 Elizabeth street. The structure, with machinery and equipment, is estimated to cost $100,000. Contract for construction has been awarded to J. A. Henderson, 30 East 42nd street.

New York, N. Y.—The New York Edison Co., Irving place and 15th street, has awarded a contract to the Clough-Bowne Co., Inc., 101 Park avenue, for the construction of a transformer station at 421 East Sixth street. The structure, with machinery and equipment installation, is estimated to cost $350,000.

Potsdam, N. Y.—The St. Lawrence Transmission Co. has filed application for permission to construct and operate an electric system for furnishing service to the town of Fowler, St. Lawrence county.

Belvidere, N. J. — The Belvidere Water Supply Co. has been granted permission by the State Board of Public Utility Commissioners to dispose of its pumping plant and equipment located on the Delaware river to Victor De Journo, Allentown, Pa., for a consideration of about $20,000. It is understood that the plant will be operated in connection with a new soap manufacturing works to be established at this location by the new owner.

High Bridge, N. J. — The Jersey Electric Co. has had plans prepared for the construction of an electric transmission line to extend between Clinton and Annandale along state highway route No. 9.

Irvington, N. J.—F. C. Mesa, Chancellor avenue, manufacturer of ammunition, is having plans prepared for the construction of a one-story brick factory building and power plant, to be used for general works operations. The structure will be about 100 by 120 ft., and will be used as an extension to the existing plant.

Morristown, N. J.—The State Board of Public Utility Commissioners has approved the sale of the property of the United Electric Co., Morristown and Boonton, to the Morris & Somerset Electric Co., of Morristown, for a consideration of $350,000. The company has also been granted permission by the commission to issue stock for $200,000 and notes for $350,000, the proceeds to be used for the above purchase, as well as for extensions and improvements now under way and to be made.

Newark, N. J.—Samuel Jones & Co., 37 McClellan street, manufacturer of gummed paper, has awarded a contract for the construction of a factory addition and boiler plant. The structures will cost about $12,000 and $13,000, respectively. The Charles R. Hedden Co., 763 Broad street, has the contract.

Newark, N. J.—A statement has recently been issued by the New York Telephone Co. to the effect that a total of 13,611 new telephones have been installed in the four month period ended May 1, an unusually large number, despite this fact over 11,000 applications for installation are still on file for the New Jersey territory.

Trenton, N. J. — In a report filed with the State Board of Public Utility Commissioners by the Public Service Railway Co., it is set forth that the net income of the company for the month of April, 1920, totaled $108,099.53 as against a deficit of $96,496.01 for the corresponding month during 1919. During the month of April, 1920, the company transported a total of 37,893,565 passengers over its traction system.

Trenton, N. J.—The South Jersey Gas, Electric & Traction Co. has had plans prepared for the construction of a one-story brick building on Chaunsey street. The structure is estimated to cost about $12,000.

Westmont, N. J. — The township committee has completed arrangements for the installation of new electric lighting units for the street lighting system on Haddon avenue. Service is furnished by the Public Service Electric Co.

Allentown, Pa. — Peters & Jacoby Co., manufacturer of ice cream, has completed negotiations for the purchase of the three-story brick and stone building at Church and Maple streets, and plans are now under way for extensive remodeling, etc., to suit the new line of manufacture. Consid-

able electrical and refrigerating equipment, etc., will be utilized.

Chester, Pa.—Fire, on May 29, destroyed the boiler shop at the plant of the Chester Steel Casting Co., with loss estimated at about $50,000. It is understood that the company will rebuild the destroyed building.

Harrisburg, Pa.—The city council is understood to be considering plans for the installation of additional electric lighting units in the uptown and Allison Hill districts of the city.

Harrisburg, Pa.—Negotiations are under way between the Harrisburg Light & Power Co. and the city council for the use of a pole line in Derry street, formerly utilized by the Western Union Telegraph Co., which has placed its lines underground in this section. It is planned to use the poles for a distributing system.

Philadelphia, Pa.—Fire, on June 3, at a warehouse of the Philadelphia Electric Co., 33d and Master streets, caused a loss estimated in excess of $200,000.

Philadelphia, Pa.—The State Public Service Commission has approved the application for the proposed merger of eight electric light and gas companies and their subsidiary organizations, operating in the central Pennsylvania district, into one corporation to be known as the Pennsylvania Power & Light Co. The companies affected by the consolidation plans are the Lehigh Valley Light & Power Co.; Lehigh Navigation Electric Co.; Northern Central Gas Co.; Columbia & Montour Electric Co.; Harwood Electric Co.; Pennsylvania Power & Light Co.; Schuylkill Gas & Electric Co., and the Pennsylvania Lighting Co. The new organization will have a stated capital of over $9,000,000. The merger has been affected to provide for general expansion, and numerous transmission and distributing lines are under consideration, as well as increased power facilities.

Philadelphia, Pa. — The Abrasive Co. has perfected arrangements for the immediate construction of a one-story brick power plant, about 57 by 60 ft., at its works at James and Fraley streets. The structure is estimated to cost about $25,000.

Philadelphia, Pa.—Edward Noon & Son, 4021 Germantown avenue, have had plans prepared for the erection of a new boiler house extension to their plant.

Philadelphia, Pa.—The L. H. Gilmer Co., Cottman and Keystone streets, has awarded a contract for the construction of a three-story brick warehouse building, to be located at Cottman and Keystone streets. In connection with this structure, a new power plant for operation will also be erected, the entire structure to be about 93 by 160 ft. The project is estimated to cost $200,000.

Nanticoke, Pa. — The Delaware, Lackawanna & Western Railroad Co. has awarded contracts for the construction of a one-story power plant, to be located near Nanticoke, Pa. The structure will be about 60 by 60 ft., and is estimated to cost $75,000. Ludwig T. Stripp, Union Bank building, Scranton, Pa., has the general contract.

Baltimore, Md. — The Chesapeake Iron Works is understood to be arranging plans to increase the capacity of its structural steel department approximately 100%. Considerable electrical and mechanical equipment will be utilized.

Clearspring, Md.—The Clearspring Electric Light & Power Co. has recently inaugurated operation of the electric street lighting system recently installed for municipal service.

Easton, Md. — The city council is having plans prepared for the installation of a pumping plant for the municipal waterworks system. Complete new equipment will be installed, including two large electrically operated centrifugal pumps with capacities ranging from 150 to 600 g. p. m.

Washington, D. C. — The Chesapeake & Potomac Telephone Co. was granted permission by the Public Service Commission to place a new schedule of increased rates for service in effect June 1.

Washington, D. C.—The Potomac Electric Power Co., 231 14th street, has awarded a contract to S. R. Harris, 710 14th street, for the construction of a one-story substation building, to facilitate operations. A. B. Heaton, Maryland building, is the architect on the work.

Millville, W. Va.—The Hagerstown & Frederick Railway Co., Hagerstown, Md., is completing plans for the construction of a high-tension transmission system to extend from Millville, W. Va., to Winchester, for increased operations. M. A. Pooler is the general manager of the company.

Anderson, S. C.—The Gluck Mills are understood to be arranging plans for improvements and extensions in the electric light and water systems, the work being estimated to cost about $150,000. W. Z. McCue is in charge of the work.

Louisville, Ga.—The city is understood to be considering plans for the immediate rebuilding of the municipal electric light plant and water-pumping station, recently destroyed by fire, with loss estimated at about $20,000.

Montezuma, Ga.—The Montezuma Light & Power Co. is in the market for electrical equipment.

NORTH CENTRAL STATES.

Cleveland, O. — The Akron Spark Plug Co. has placed a contract for a one-story factory building, 60 by 125 ft.

Cleveland, O.—The American Can Co., 1677 East 40th street, is having plans prepared for a three-story addition to its plant.

Dayton, O.—An ordinance is before the common council authorizing an issue of $180,000 in bonds to install a central police and fire alarm system. Address J. E. Barlow, city manager, for further information.

Dayton, O.—L. H. Brinkman & Co., manufacturer of tools, has completed plans for a two-story factory, 60 by 90 ft., to cost about $15,000.

Marion, O.—The Osgood Co. is enlarging its plant by the erection of a 200-ft. extension to its machine shop and erecting room. The company has just completed a building 80 by 140 ft., to be used as a foundry and engine room.

McArthur, O. — The McArthur Light & Power Co. has been granted a franchise to furnish light for the village streets.

Mount Vernon, O. — The Mount Vernon Bridge Co. has increased its capital stock from $300,000 to $1,000,000.

Warren, O.—The Warren Iron & Steel Co. has commenced the erection of an addition to its plant and has made application for an increase in its capital stock from $200,000 to $2,250,000.

Decatur, Ind.—The city has been granted authority by the Indiana Public Service Commission to issue $75,000 in 6% bonds to be used for additions and improvements in the municipal electric light plant.

Evansville, Ind.—The Indiana Atomized Fuel Co. has bought five acres of land near the Crescent coal mine and will build a plant for the manufacture of powdered coal.

Indianapolis, Ind.—E. C. Atkins & Co., manufacturer of saws, will erect a two-story brick factory 50 by 133 ft., at Henry and Eddy streets, at an estimated cost of $60,000.

Webster, Ind.—The North Webster Water & Light Co. will sell electric power to residents of North Webster and farmers along the line from Leesburg to Webster. The company has made arrangements to purchase the necessary power from the Winona Interurban Railway Co.

Almont, Mich.—Construction work has been started on the new unit of the Almont Manufacturing Co., which will provide a floor space of 70 by 80 ft., with an addition 25 by 25 ft., two-stories high, for cupola space. The additions will double the present capacity of the plant.

Cadillac, Mich.—It has been decided to install an electric light plant at the Cadillac Club on Lake Mitchell. W. H. Yearnd, president of the club, is head of the committee in charge of the project.

Grand Rapids, Mich.—The Citizens' Telephone Co. will erect an $85,000 telephone exchange building. The contract for the building has been awarded to John Weeber, 863 Lafayette avenue, Grand Rapids, Mich.

Jackson, Mich.—The General Machine & Tool Co. has awarded a contract to J. C. LaDuke, Jackson, Mich., for a one-story plant, 92 by 140 ft., to cost about $150,000.

Saginaw, Mich.—The Federal Sand & Gravel Co. is spending $50,000 for new machinery and equipment at its newly opened gravel pit.

Chicago, Ill.—The Central Steel & Wire Co., 127 North Paulina street, has purchased a site, 432 by 460 ft., at the corner of Western avenue and 45th street, and will construct a one and two-story warehouse, covering the entire site, to cost $450,000.

DeKalb, Ill.—The Superior Machine Co. will make extensions and im-

provements in its plant to cost about $100,000.

Galesburg, Ill.—The city will install electric lights in Lincoln Park. Address Frank Connelly, city engineer, for further information.

Hardin, Ill.—A proposition to bond the city for $5000 for light and power bonds was defeated by the voters.

Joliet, Ill.—The Illinois State Penitentiary has had plans prepared for a one-story power plant, 70 by 80 ft., to cost about $50,000. H. W. Tomlinson, Woodruff building, Joliet, Ill., is in charge of the work.

Beloit, Wis. — The Beloit Water, Gas & Electric Co. has increased its capital stock from $1,000,000 to $1,500,000.

Beloit, Wis. — The Beloit Iron Works, manufacturer of wood-working and paper-mill equipment, has awarded a contract to the Austin Co., 208 South La Salle street, Chicago, for a brick and steel gray iron foundry addition, 117 by 160 ft., costing about $100,000 complete. One 10-ton and one 15-ton electrically operated crane will be installed.

Elroy, Wis.—The city is considering the purchase of electric power from Reedsburg or Maustin, Wis., and also contemplates the erection of a transmission line from Reedsburg. J. W. Cadby, engineer, Washington building, Madison, Wis., has prepared plans for the work.

Milwaukee, Wis.—The park board has accepted the plans of the municipal bureau of illumination for the lighting of Washington Park with 160 electric lamps, replacing the naphtha lamps now in use.

Peshtigo, Wis.—The Peshtigo Pulp & Paper Co. has been granted permission to build a power dam at Potato Rapids, on the Peshtigo river, 6 mi. from Peshtigo.

Algona, Ia.—The Cresco Light & Power Co. has petitioned the State Public Utility Commission for authority to construct and maintain poles, wires, electric fixtures and electric transmission lines to serve the territory contiguous to Algona.

Hartley, Ia.—The city will erect an electric power plant. For further information address H. T. Broders, city clerk.

Osceola, Mo.—A project to construct a dam across the Osage river, near Osceola, for the generation of electric power has been taken up by the Osceola Commercial Club.

Nebraska City, Neb. — Contracts will be let for the erection of a two-story telephone exchange building of brick and stone construction.

Iroquois, S. D.—The Iroquois Light & Power Co., W. L. Jordan, proprietor, is making improvements to its electric light plant.

Rockham, S. D.—The city is contemplating erecting an electric power plant.

Jamestown, N. D.—The Jamestown-Medina High Line Co. has asked permission of the State Utility Commission to sell $100,000 in stock for the purpose of building a 30-mi. high tension electric power line.

SOUTH CENTRAL STATES.

Louisville, Ky.—The plant of the Louisville Steel & Iron Co. has been acquired by new interests. Additions to cost in excess of $200,000 are planned.

Louisville, Ky. — B. F. Avery & Sons, who recently increased their capital stock from $2,300,000 to $6,000,000, is understood to have purchased the business, good will and name of the Champion line of agricultural machinery, now being built at Springfield, O., and will shortly commence the manufacture of these machines in Louisville.

Morristown, Tenn. — The city has completed plans for extensions in the municipal electric light system, estimated to cost about $30,000. F. W. Donaldson is mayor of the city.

Huntsville, Ala.—The National Basic Fertilizer Co., recently organized, is planning the erection of a large plant. T. W. Pratt is the manager of the company.

Columbus, Miss. — P. W. Maer, Progress building, is in the market for electrical refrigeration and ice plant machinery.

New Orleans, La.—The Doullutt & Williams Shipbuilding Co. is planning an extension to its machine shop in which considerable new electrical equipment will be installed.

Tahoka, Tex.—The city board of trustees is planning for the erection of a municipal electric light plant to cost about $15,000.

Vernon, Tex. — The Texas Public Service Co. is considering plans for additions and improvements in the electric light and power plant, estimated to cost about $100,000. A. V. Foster is the president of the company.

Wharton, Tex.—The plant of the Texas Gas & Electric Co. was recently destroyed by fire, leaving the city without lighting or ice supply facilities.

Claremore, Okla.—The city is having plans prepared for extensions and improvements in the municipal electric light and power systems, including the construction of additions to the power plant, as well as the installation of machinery and equipment comprising rotating field alternator, exciter, switchboard and cables, new boiler apparatus, pumping units, condenser and steam piping, engine, and other equipment. W. M. Willis is the mayor of Claremore.

Shawnee, Okla. — The Shawnee Metal Manufacturing Co. has increased its capital stock by $40,000 and will add new equipment to its plant.

WESTERN STATES.

Great Falls, Mont.—The Mountain States Telephone Co. will construct a line between Conrad and Great Falls, replacing poles and transmission lines over a 76-mi. stretch. F. E. Farwell, Great Falls, is the manager of the company.

Laurel, Mont.—A contract has been let to the Montana Power Co. for a lighting system to cost $11,617. Address A. L. Garvey, city clerk, for further information.

Yakima, Wash.—The Mars Manufacturing Co. has moved its plant to this city from Seattle. A one-story brick factory has been erected for the manufacture of truck attachments.

Newport Beach, Cal.—The Universal Steel Wheel Co. is arranging for the erection of a plant. E. D. Burge, Santa Ana, Cal., is the president of the company.

San Francisco, Cal. — The Power Construction Co. has bought 2½ acres in South San Francisco and will erect a factory to cost $35,000, with equipment.

San Francisco, Cal. — The Pacific Car Building Co. has awarded a contract to the Unit Construction Co., Phelan building, for a new plant at Woodland to cost about $225,000. Two reinforced concrete buildings, 160 by 508 ft., and a two-story building, 40 by 160 ft., will be erected.

Woodland, Cal.—Officials of Reclamation District No. 8 are arranging for the immediate erection of a steam-operated electric power plant in the vicinity of Knight's Landing, to cost about $80,000.

CANADA.

Fergus, Ont.—Beatty Bros., manufacturers of pumps, washers, etc., have increased their capital stock from $750,000 to $2,000,000 to provide additional capital stock to take care of increased business. It is the intention of the company to spend $150,000 this year on additions and new machinery.

Galt, Ont.—The Elliott & Whitehall Machine & Tool Co. will build a large plant for the manufacture of milling cutters, small tools, metal stamping dies, jigs and fixtures.

Petrolia, Ont.—The Draper Manufacturing Co., Port Huron, Mich., will reopen and enlarge its plant at Petrolia, which was closed some time ago.

Toronto, Ont.—The Canada Metal Co., 35 Fraser avenue, is in the market for a 15-hp., 750-r. p. m., 550-volt, three-phase, 25-cycle, electric motor.

INCORPORATIONS.

Brooklyn, N. Y.—Cook Sure Fire Commutator Co. Capital stock, $60,000. To manufacture commutators, etc. Incorporators: J. Gaydica, F. C. Spinner, and G. E. Cook, 45 Tehama street.

New York, N. Y.—Perwin Corp. Capital stock, $12,500,000. To manufacture electrical and mechanical devices, etc. Incorporators: Frank F. Lapp, George McFadden, New York, and William F. Cornell, Freeport, L. I.

Rochester, N. Y.—Rochester Electric Products Corp. Capital stock, $125,000. To manufacture electrical specialties, etc. Incorporators: E. Smith, Jr., E. F. Davison, and J. H. Kimmel, Rochester.

Newark, N. J.—International Gas Recorder Manufacturing Co., 9 Clinton street. Capital stock, $1,000,000. To manufacture measuring instruments, etc. Incorporators: Fred Evans, Summitt, Edward A. Gitt, and Frederick C. Fisher, Newark.

The Relation of the Business Press to Industry

The business press has, for many years, functioned in two important ways, which may be summarized in the statement that it reflects and directs. It requires only a hasty glance at any business paper to see that it reflects the industry, but to direct the industry is a far more important function and one which has come to be exercised only in recent years.

Aside from the human element in industry, there is need for a wider use of improved machinery, of better methods, and the business press is doing much to stimulate progress in this direction. All of this cannot be accomplished through the editorial columns; the manufacturers of improved machinery cannot escape their responsibility for advertising their products to those who ought to install them.

It is a time for concerted action all along the line to adjust, repair and improve everything which will tend to rescue American industry from its present morass of doubt and uncertainty, which is contributing to shortages of necessary goods, high costs and inevitable unrest on all sides.

A multiplicity of developments in your own industry have been recorded and perhaps brought to your attention for the first time through the columns of your own chosen business publication. This is what I would term reflecting the industry, but to reflect the important developments, the latest devices, the most revolutionary events, properly, means the discretion of a wise and experienced editor together with a staff of men that constantly visit the factories, the mills, the offices of the industry, in order to gather the most reliable and up-to-date facts. This function of reflecting the industry comes near to being a research department for the industry as a whole.

It is not the editorial pages of the business press alone that render great service and perform important functions. A business paper would lose at least one-half of its value to the industry and to its subscribers individually if the advertising sections were omitted. In fact, to many readers of trade and technical papers, the advertising section is of the greatest importance. I know this from a questionnaire which I sent out to a great many readers of a large publication several years ago asking this very question. In fact, many of them stated that they took the paper primarily for the advertising. Never before was this advertising of so great value to the industries as at the present time. In attempting to solve this problem of production, there is great need for the most modern equipment and up-to-date labor-saving machinery that can be purchased, and it is usually the fact that equipment that is not advertised in the business press, reaching its own industry, is not on the market.

The editorial and advertising sections of a really useful business paper are co-ordinate in their relation and each helps the other in fulfilling its mission to the readers. They may be characterized by saying that the reading section tells the reader "how" and the advertising section tells him "what with."

In almost any industry, increased production means a constant changing of equipment and a bringing in of new processes and machinery; and the function of the advertising pages is to keep constantly before its industry the newest and best that will contribute to the improvement of the industry and also information as to just how and where this can be purchased.

The above extracts from an address made by M. C. Robbins, New York, before the Chamber of Commerce of the United States are particularly worth reading at this time.

C. A. TUPPER, PRESIDENT,
INTERNATIONAL TRADE PRESS, INC.,
CHICAGO.

FINANCIAL NEWS

Comment on the Financial Outlook in the Electrical Industry, New Securities, Reports of Earnings, Dividends and Utility Stocks

Many Lighting Companies Now Financing Big Projects.

Despite the fact that the money market is tight and interest rates high where public utility companies are concerned many companies are successfully arranging for large loans for expansion and improvement purposes. The American Light & Traction Co., 120 Broadway, New York City, has just completed arrangements for a note issue of $6,000,000 for general expansion purposes, the notes being five year 6% gold notes of the company, offered at 94¾ and interest, to yield over 7¼%.

The net income of the company for each year since 1917 has amounted to over $4,260,000, as compared with the annual interest requirements on this issue of $360,000. The notes carry with them stock warrants which permit holders to purchase common stock of the company in the ratio of ⅔ of one share for each $100 face value of notes at $142 per share on or before May 1, 1922, $147 per share thereafter to and including May 1, 1924, and $152 per share thereafter to and including May 1, 1925. The value of the warrants attached to one $1000 note ranges from $33 with stock selling at $147 a share to over $650 with the stock selling at $250 a share. During 1920 a high of 200 has been reached, whereas the previous high was $450 a share.

The business field covered by the company embraces a present estimated population of 2,400,000 including some of the most important cities of the United States, notably Detroit and Grand Rapids, Mich., Milwaukee and Madison, Wis., St. Paul, Minn., San Antonio, Tex., St. Joseph, Mo., and Binghamton, N. Y. The company now has 59,856 electric consumers and in 1919 sold 77,051,159 kw-hrs. of energy.

The Northern Ohio Traction & Light Co. has issued $2,000,000 in six year 7% secured gold bonds to be offered at 96 and interest to yield about 7.85%. The electric light and power business of this company has grown from $204,000 in 1910 to over $3,321,000 for the year ended, March 31, 1920, an increase of over 1600% in slightly more than nine years. The company operates in the Cleveland-Akron-Canton industrial section of Ohio.

Other bond issues recently authorized by various companies include $10,000,000 first and refunding mortgage gold bonds of the Detroit Edison Co. to bear 6% interest; a $5,000,000 issue of general and refunding mortgage 6% bonds by the Southern California Edison Co., offered at 88½ and interest to yield 7% to maturity, Feb. 1, 1944, and a $5,000,000 loan recently arranged by the Commonwealth Edison Co., through Chicago bankers.

Republic Railway & Light and Subsidiary Companies.

	1920.	1919.
April gross	$ 659,568	$ 493,363
Net after taxes	155,384	115,775
Total income	182,184	147,829
Surplus after charges	61,754	33,793
Balance after preferred dividends	35,797	7,836
Twelve months' gross	6,916,361	5,704,956
Net after taxes	1,726,706	1,364,783
Total income	1,902,517	1,575,267
Surplus after charges	506,750	262,811
Balance after preferred dividends	195,266	*48,672

*Deficit.

Virginia Railway & Power Co.

	1920.	1919.
April gross	$ 845,445	$ 742,180
Net earnings	315,072	321,184
Total income	328,341	333,578
Surplus after charges	128,867	163,541
Ten months' gross	8,179,638	6,929,991
Net earnings	3,169,966	2,394,861
Total income	3,302,361	2,521,844
Surplus after charges	1,400,718	756,775

Canadian Westinghouse, Ltd.

The Canadian Westinghouse, Ltd., reports for the year ended Dec. 31 earnings of $1,416,205 compared with $1,622,048 in 1918; surplus after dividends $102,584, compared with $310,072 in 1918.

Nebraska Power Co.

	1920.	1919.
March gross	$ 228,355	$ 183,459
Net after taxes	80,913	63,667
Total income	82,021	64,029
Surplus after charges	49,698	38,023
Twelve months' gross	2,543,471	2,015,380
Net after taxes	901,483	717,639
Total income	961,206	761,015
Surplus after charges	591,700	461,430
Balance after preferred dividends	346,700	216,430

Texas Power & Light Co.

	1920.	1919.
March gross	$ 338,252	$ 268,713
Net after taxes	101,900	80,309
Total income	102,169	80,492
Surplus after charges	46,520	25,981
Twelve months' gross	3,657,448	3,324,580
Net after taxes	1,244,576	1,078,311
Total income	1,252,822	1,080,526
Surplus after charges	597,334	406,353
Balance after preferred dividends	348,834	157,853

Havana Electric Railway, Light & Power Co.

	1920.	1919.
February gross	$ 864,439	$ 703,156
Net earnings	426,473	351,010
Total income	433,168	356,508
Surplus after charges	242,281	166,267
Two months' gross	1,747,557	1,429,514
Net earnings	872,536	699,049
Total income	885,283	713,558
Surplus after charges	503,699	328,178

Portland Gas & Coke Co.

	1920.	1919.
March gross	$ 200,332	$ 174,196
Net after taxes	79,520	73,784
Total income	79,529	73,784
Surplus after charges	49,278	43,730
Twelve months' gross	2,254,574	1,940,006
Net after taxes	944,438	850,172
Total income	944,519	850,172
Surplus after charges	592,088	497,164
Balance after preferred dividends	425,428	349,480

Pacific Power & Light Co.

	1920.	1919.
March gross	$ 187,709	$ 151,738
Net after taxes	68,665	65,939
Total income	69,100	66,252
Surplus after charges	24,538	20,107
Twelve months' gross	2,288,573	1,908,277
Net after taxes	1,087,123	868,246
Total income	1,096,761	874,783
Surplus after charges	561,974	351,914
Balance after preferred dividends	371,555	162,914

Kansas Gas & Electric Co.

	1920.	1919.
March gross	$ 286,927	$ 224,568
Net after taxes	62,285	56,606
Total income	62,703	56,880
Surplus after charges	17,323	16,860
Twelve months' gross	2,824,402	2,295,909
Net after taxes	803,908	749,556
Total income	807,033	767,564
Surplus after charges	300,417	344,911
Balance after preferred dividends	148,346	211,752

Subsidiary Utah Securities Corp. Co.'s.

	1920.	1919.
April gross	$ 683,275	$ 572,157
Net earnings	338,241	302,199
Twelve months' gross	7,740,272	7,059,369
Net earnings	3,864,225	3,747,460

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

	Div. rate. Per cent.	Bid June 1.	Bid June 8.
Public Utilities—			
Adirondack Electric Power of Glens Falls, common	6	10	10
Adirondack Electric Power of Glens Falls, preferred	6	68	70
American Gas & Electric of New York, common	10+extra	95	98
American Gas & Electric of New York, preferred	6	37	37
American Light & Traction of New York, common	..	138	139
American Light & Traction of New York, preferred	6	80	80
American Power & Light of New York, common	4	45	50
American Power & Light of New York, preferred	6	65	65
American Public Utilities of Grand Rapids, common	..	3	4
American Public Utilities of Grand Rapids, preferred	7	12	13
American Telephone & Telegraph of New York	..	101	102
American Water Works & Elec. of New York, common	..	2	2
American Water Works & Elec. of New York, particip	7	6	6
American Water Works & Elec. of New York, first preferred	..	38	37
Appalachian Power, common	..	2	2
Appalachian Power, preferred	7	14	14
Cities Service of New York, common	+extra	330	330
Cities Service of New York, preferred	6	64	65
Commonwealth Edison of Chicago	8	100	102
Comm. Power, Railway & Light of Jackson, common	..	18	18
Comm. Power, Railway & Light of Jackson, preferred	6	37	39
Federal Light & Traction of New York, common	..	6	6
Federal Light & Traction of New York, preferred	..	41	41
Middle West Utilities of Chicago, common	..	18	18
Middle West Utilities of Chicago, preferred	..	32	31
Northern States Power of Chicago, common	..	35	36
Northern States Power of Chicago, preferred	ex.div.7	77	77
Pacific Gas & Electric of San Francisco, common	..	58	58
Public Service of Northern Illinois, Chicago, common	7	75	76
Public Service of Northern Illinois, Chicago, preferred	6	78	79
Standard Gas & Electric of Chicago, common	..	14	13
Standard Gas & Electric of Chicago, preferred	6	36	36
Tennessee Railway, Light & Power of Chattanooga, common	..	1	1
Tennessee Railway, Light & Power of Chattanooga, preferred	6	3	3
United Light & Railways of Grand Rapids, common	4	18	18
United Light & Railways of Grand Rapids, preferred	6	56	55
Western Power of San Francisco, common	..	14	14
Western Union Telegraph of New York	extra	82	82
Industrials—			
Electric Storage Battery of Philadelphia, common	4	103	103
General Electric of Schenectady	8	175	180
Westinghouse Electric & Mfg. of Pittsburgh, common	7	54	55